The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XIX. No. 483 SEPTEMBER 29, 1928 Prepaid Annual Subscription: United Kingdom, £1.1.0; Abroad, £1.5.0.

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.*

Editorial and General Offices: Bouverie House, 154, Fleet Street, London, E.C.4.

Telegrams: "Allangas, Fleet, London." Telephone: City 0244

Fuel Developments

PROBABLY by design, the report of the Fuel and Power Committee appeared in the week in which the Fuel Conference (World Power Conference) commenced its deliberations. The outstanding point in the report is the suggested institution of a network of gas mains in this country, fed by gas works, coke ovens, and the like. On the Continent this system has obtained for some time, and in the Ruhr district extensive developments connected with it are taking place. In that area the question involved is not merely that of transmission of gas over long distances. Recent reports have stated that some of the gas is to be used for the production of synthetic nitrogenous fertilisers, and if there is any truth in the reports the production will be on an enormous scale. The points mentioned above show how close is the interconnection between superficially diverse interests. In Germany, at any rate, ironworks, through their interest in coke ovens, have turned towards the production of synthetic fertilisers. It is obvious, also, that there are possibilities of utilising gases from coke ovens, etc., for the production of synthetic fuels.

The Fuel and Power Committee, in order to give a concrete example of the application of its suggestion, suggest that the possibility of such development should be surveyed in the area between the Humber and Liverpool, and between Leeds and Birmingham. With remarkable promptness the suggestion has been accepted by the Government. On Monday, at the Fuel Conference banquet, Sir Philip Cunliffe-Lister, the President of the Board of Trade, announced this decision, expressing the hope that the interested industries would assist in the survey by lending their technicians. This inquiry must in any case lead to some important results, for, apart from everything else, it will probably accumulate a mass of statistics of very great value. But there will be more in the matter than that. In making the suggestion, the Fuel and Power Committee point out that "such survey should, in our opinion, also consider the disposal of the coke, the location of coke oven plants with respect to iron and steel works, and the existing and potential consumption of coke, whether for the iron and steel industry or for domestic purposes." If the survey is thus to consider the needs of the iron and steel industry as indicated, it can hardly be assumed that it will completely ignore that industry itself. In however distant a manner, some attention is likely to be paid to the operations of the iron and steel industry. In fact, the inquiry which is to be begun into the question of gas production and disposal is likely to lead, before it ends, in many unexpected directions.

Another point to which the Fuel and Power Committee paid a good deal of attention was the question of the training of technical men. That it should do so was not altogether surprising, but what is of great interest is the fact that the evidence before the Committee showed that the urgent need for trained men has been recognised in several of the industries connected with fuel. This particular part of the report is likely to be an eye-opener as far as most of those who read it are concerned.

Meanwhile, the London Fuel Conference has commenced its meetings. The range of its activities is so vast, and the papers presented so long and numerous, that so far it has been utterly impossible to collect more than a few scattered impressions. In the circumstances, perhaps the best course to pursue is to concentrate on a few subjects, and to digest them thoroughly. Up to now, one of the most chemical of the papers has been that of Mr. P. Parrish on "Some Technical and Economic Aspects of By-Product Ammonia Recovery," published in condensed form elsewhere in this issue. The onset of synthetic products has dealt a severe blow at the by-product ammonia industry. For some time past various suggestions for

increasing the efficiency of methods of ammonia recovery have been made. In the present paper, Mr. Parrish considers these suggestions from two points of view: Firstly, that of the chemist and chemical engineer, and secondly, the financial point of view. As a result, the comparative study of various methods provided is likely to be of immense value to the gas industry. In particular, the admirable study of the anhydrite method will be read with great interest. Sir Frederic Nathan's paper on "Alcohol for Power Purposes" (also reproduced in this issue) will be something of a cold douche for those who were over-optimistic in this matter.

There can be no doubt of the immense value of the Fuel Conference. Nevertheless, it may not be altogether out of place to offer some sympathy to the fuel technicians. The conference and congress habit is growing. Most technical men, faced as they are with a steadily-growing list of meetings and discussions, must begin to find the encroachments on their time becoming very onerous. But the fuel technician seems, at the moment, to deserve pity above all others: to him life must seem one long conference. Next week, he finishes a fortnight's meeting in London; and, very shortly, he must repair to Pittsburgh to start all over again. It is a hard life. Our correspondent, who attended the recent meeting of the American Chemical Society at Swampscott, indicates in his notes that the Americans are beginning to feel uneasy about the colossal programmes which these meetings now present. That feeling is a general one, and it will be interesting to see what action is taken to deal with the matter. We shall be surprised if in the future there is not a tendency towards simpler and shorter programmes, permitting of more time for discussion. It is only fair to add that at the London Fuel Conference a first step has been taken in this direction by issuing a general report on the papers in each section, and discussing this report and not the individual papers themselves.

Chemical Importers' Certificates

THOUGH the Customs authorities have not yet replied definitely to the representations recently made to them by the Chemical and Dyestuffs Traders' Association in reference to certificates of value from importers, we understand that, pending an official decision, entries from members of the Association for dutiable chemicals will be accepted without certificates, and invoice values will be treated as the basis for duty for the clearance of goods on deposit in all cases where they are considered to be satisfactory. There is, we are informed, no need at present to complete the certificates nor to pay as a deposit any amount in excess of *bona fide* invoice values. The proviso as to cases being considered satisfactory may, of course, give the Commissioners power to take other action where they think it necessary, but it seems possible that they may be willing to accept the traders' case as put before them recently.

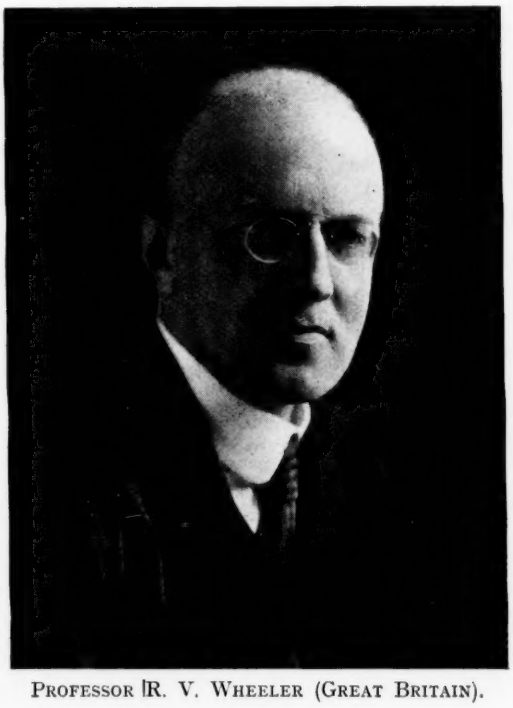
In the ordinary way an invoice showing the c.i.f. value of any goods imported would be taken to represent the value at the time of importation, and would be the figure at which the goods should be assessed for Key Industry Duty. In dealing with an importer, that would appear to be the view of the Commissioners, but when the goods are imported by an agent, not for himself, but for re-sale, or where, for example, a foreign company has an agency or subsidiary company in this country for the purpose of importing and selling its products, the Commissioners see a possibility of nominal invoice values being declared that do not fairly represent the real selling value of the goods. Some internal arrangement of this kind is, of course, conceivable, the effect of which would be to enable the importing parties, by paying a reduced duty, also to sell at a lower rate in competition with home products. This might to a certain extent neutralise the duty imposed on foreign competitive goods and to that degree defeat the purpose of the Safeguarding of Industries Act. But such practices, which amount to an evasion of duty, cannot be assumed to be general, any more than the evasion of income tax can be so assumed, and *bona fide* importers, whose transactions are correctly revealed in their invoices, naturally resent a system of inquisition involving examination of their books and other evidence.

Naturally, every person who imports goods into England expects to make a profit by selling them at a higher rate; it is the ordinary process of merchanting. But State control has not yet reached the point of fixing the percentage of profit an importer is entitled to make, and for duty purposes the value is obviously the genuine price paid when goods enter this country. A certificate in itself, even if it were demanded, would not be conclusive evidence, for an importer who manipulated his invoice would probably possess the ingenuity to manipulate his certificate, though the mere procedure of having to supply one might make him cautious. The simple plan would appear to be to accept the invoice as expressing the *bona fide* value, and in suspicious cases the Commissioners would have to take special steps, as the Income Tax Commissioners do in similar circumstances. To impose on the whole chemical industry a number of fussy and irritating restrictions on the assumption that something may be wrong in certain cases would be to introduce a remedy very much worse than the disease.

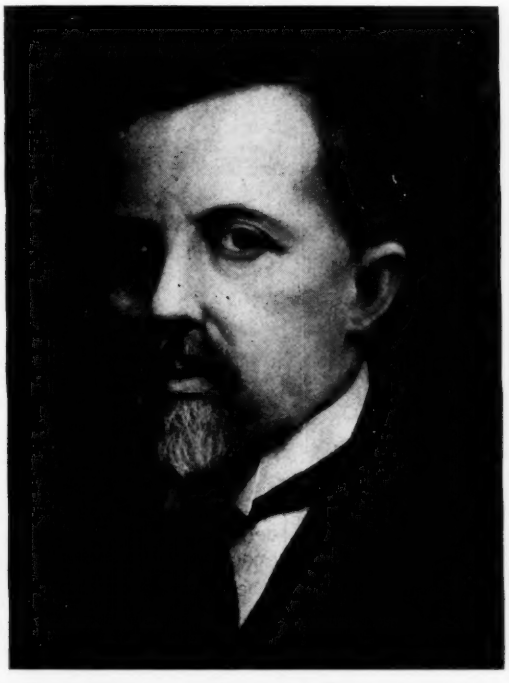
The Calendar

Sep. 24-Oct. 6	World Power Conference. Fuel Conference.	Imperial Institute, London.
Oct. 1	Society of Chemical Industry. Chemical Engineering Group. Joint meeting with the London Section: "Road-Surfacing Materials." W. J. A. Butterfield.	London.
3	Society of Public Analysts: Papers by G. W. Monier-Williams, T. McLachlan, W. R. Schoeller and E. F. Waterhouse. 8 p.m.	Burlington House, Piccadilly, London.
4	Society of Chemical Industry (Bristol Section): "Chilean Nitrate of Soda." Dr. S. Williamson.	University, Woodland Rd., Bristol.
5	Society of Chemical Industry. Chemical Engineering Group. Joint meeting with the London Section. "Factory Floors." F. H. Rogers.	London.

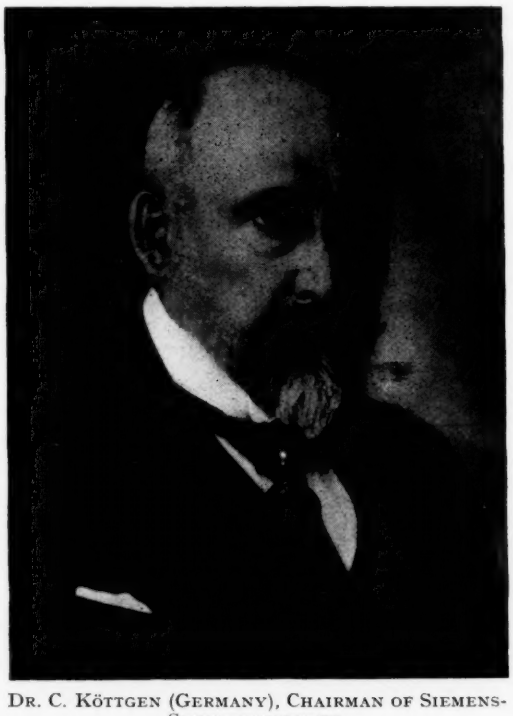
Delegates to the Fuel Conference



PROFESSOR R. V. WHEELER (GREAT BRITAIN).



DR. C. MATSCHOSS (GERMANY), DIRECTOR OF THE UNION OF GERMAN ENGINEERS.



DR. C. KÖTTGEN (GERMANY), CHAIRMAN OF SIEMENS-SCHUCKERTWERKE.

Elliott & Fry

DR. A. E. DUNSTAN (GREAT BRITAIN).

The Problem of By-Product Ammonia Recovery

Mr. Parrish's Paper Before the Fuel Conference

The London Fuel Conference (World Power Conference) began on Monday, at the Imperial Institute. In view of the difficulty of covering adequately the large field of the Conference's deliberations, attention has been devoted solely to the papers of most chemical interest. On Thursday, among the papers presented was that on "Some Technical and Economic Aspects of the By-Product Ammonia Recovery Problem," by Mr. P. Parrish, which appears below in condensed form.

No one denied, said Mr. Parrish, that the manufacture of ammonium compounds from by-product ammonia on an economic basis constituted a distinct problem at the present time. The progressive increase in the production of ammonium sulphate manufactured from synthetic ammonia, and the consequent fall in selling price, made the problem more acute. An indication of the gravity of the situation was afforded by the recollection that, fifteen years ago, the realisation by many gas undertakings by the recovery of ammonia and its conversion to sulphate of ammonia or other ammonium salts, represented 15 to 20 per cent. of the cost of the coal. To-day, the larger gas undertakings deemed themselves fortunate if their revenue for by-product ammonia covered 5 per cent. of the cost of the coal. These conditions, in a measure, applied to coke ovens. The cost of recovering by-product ammonia to-day at many medium and small gas undertakings ranged from 6d. to 1s. 6d. per ton of coal carbonised.

By-Product and Synthetic Ammonia

The question arose at once: Why should it cost more to recover and subsequently release ammonia from gas liquor than it did to produce ammonia by a complicated process, involving expensive plant?

One outstanding factor could not be ignored. This related to the magnitude of the manufacturing operations at the synthetic ammonia works at Billingham. It had been announced that they hoped to complete their programme by 1930, when the total output of ammonium products would be equivalent to 2,100 tons of sulphate per day, or over 750,000 tons per year. Even assuming this programme was not realised, and that, in view of Lord Melchett's declaration at the Adriatic Conference, the eventual output would be 1,000 tons per day, or 360,000 tons per year, it was a stupendous quantity. The largest works producing ammonium sulphate from by-product ammonia did not exceed 25,000 tons per year.

It was recognised that gas for power, lighting and heating was the primary product of gas undertakings, and that the recovery of ammonia was a secondary consideration. Similarly, in the case of coke-oven plants, coke was the primary product, and the recovery of ammonia a less important consideration. Ammonia, however, must be recovered, whether gas or coke was the primary product, and, dependent on the nature and efficiency of the recovery process, a revenue or a loss of some significance might be incurred.

Centralisation of Carbonisation or of Ammonia Treatment?

Many agreed that there were far too many gasworks carbonising coal to-day. It was true that the cost of the transmission of gas was an important item in the selling price of coal gas. Even so, it could not be doubted that carbonisation could be concentrated at a number of points with advantageous results. Any such concentration would be a step in the right direction in mitigating the gravity of the by-product ammonia recovery problem. Despite any such centralisation of carbonisation as was foreshadowed, the belief was held that the recovery of ammonia at the majority of works should only proceed to a certain point, and that its final treatment should be carried out at a number of centrally-situated chemical works. At such works, spent oxide should be converted into sulphuric acid, and the ammoniacal intermediate products should undergo treatment in the manufacture of final ammonium products. What the situation of these works should be, and how many carbonising undertakings they should embrace, needed to be viewed from both the technical and economic aspects.

Various Suggestions Made

During the last twelve months, many suggestions had been offered as a partial or complete solution of the problem in question. Some referred to the method by which the ammonia was recovered; others related to the utilisation of anhydrite in lieu of sulphuric acid in the manufacture of ammonium sulphate.

Some thought that the problem could be solved by adopting the direct process for the recovery of ammonia as ammonium sulphate, on the lines conducted at some of the coke-oven plants; others that concentrated gas liquor should be produced and sent to a centrally-situated works for treatment; still others that this intermediate product should take the form of concentrated ammonia liquor; and there were some, among whom Mr. Parrish numbered himself, who thought that the ammonia should be recovered at gasworks in the form of ammonium sulphate solution containing 40 per cent. $(NH_4)_2SO_4$, and that this should be sent to centrally-situated works for conversion into ammonium sulphate of uniform quality and special crystal size.

In Mr. Parrish's view there was no such thing as a direct process of sulphate of ammonia manufacture. It was true that coke-oven recovery plants were said to operate the direct process, but the last-named was more imaginary than real. A salient feature of the so-called direct process was the avoidance of any condensation prior to the absorption of ammonia in sulphuric acid. If one succeeded, ammonium chloride was usually carried to the saturator, and that apparatus and the mains leading from it must suffer from corrosion by hydrochloric acid due to the dissociation of ammonium chloride. Mr. Parrish indicated reasons for thinking that the so-called direct process was unsuitable for application to gasworks.

The semi-direct process was the one favoured by most chemical engineers and coke-oven managers in this country. It aimed at reducing the production of gas liquor to a minimum. Its application to gasworks practice would introduce defects which could not be ignored.

What were the alternatives to the processes mentioned? They would appear to be these:—

(*a*) Gasworks could still continue to recover ammonia as gas liquor, as obtained to-day, but instead of distilling the ammoniacal liquor for the manufacture of sulphate of ammonia, it would be possible, by a slight modification of the sulphate of ammonia plant, to produce concentrated gas liquor. This product could be sent to a centrally-situated works, at a reasonable cost as regards transport, for conversion to suitable ammonium products, or (*b*) Steps could be taken to recover the ammonia as a solution of ammonium sulphate, containing 40 per cent. $(NH_4)_2SO_4$.

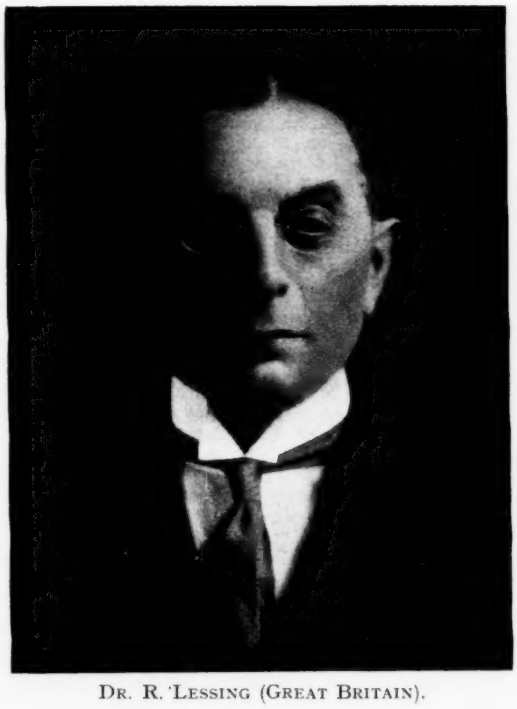
Concentrated Gas Liquor

It was certain that at many works it would be profitable to concentrate gas liquor, rather than send it, containing about 2 per cent. of ammonia, to chemical works at some distance, and then be called upon to pay for its removal. Mr. Parrish cited a case, from personal experience, which showed that this was so.

Ammonium Sulphate Solution

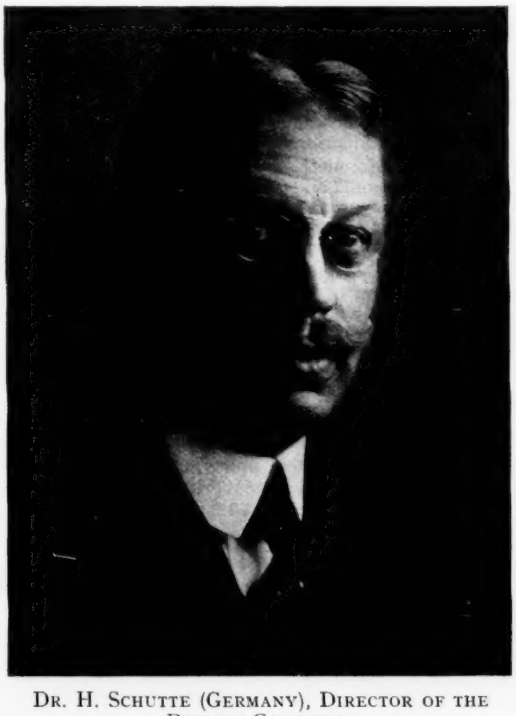
There was no technical difficulty in the recovery of 45 per cent. of the total ammonia produced in the straight carbonisation of coal as ammonium sulphate solution containing 40 per cent. $(NH_4)_2SO_4$. Indeed, the whole of the ammonia could be so recovered, provided the virgin gas liquor was distilled and suitably arrested in sulphuric acid. Where a gasworks was situated in close proximity to the sulphuric acid works, having ammonium sulphate plant, there could be no doubt that this process was likely to prove attractive, as the recovery of ammonia resulting from the carbonisation of coal as ammonium sulphate solution, 40 per cent. $(NH_4)_2SO_4$ content, need be no more expensive than the production of gas liquor. That it was a much more valuable product went without saying. The plant for the treatment of ammonium sulphate solution, 40 per cent. $(NH_4)_2SO_4$ content, in the production of crystalline ammonium sulphate, was simple to operate and not unduly expensive as regards capital cost.

Delegates to the Fuel Conference



DR. R. LESSING (GREAT BRITAIN).

PROFESSOR A. NAGEL (GERMANY), RECTOR OF THE DRESDEN TECHNICAL HIGH SCHOOL.



DR. H. SCHUTTE (GERMANY), DIRECTOR OF THE BREMEN GASWORKS.

DR. A. PARKER (GREAT BRITAIN).

Anhydrite in Lieu of Sulphuric Acid

There was still another possibility, and it was important that an examination should be made of the process for the manufacture of ammonium sulphate, where anhydrite was used in lieu of sulphuric acid, in more detail than had hitherto been extended to that aspect of the subject. Statements had appeared from time to time to the effect that the by-product ammonia problem might possibly be solved by resorting to the use of anhydrite in lieu of sulphuric acid, in the manufacture of sulphate of ammonia. Such statements should not be accepted implicitly. Indeed, the whole position should be examined scrupulously.

The number of unit processes involved in the utilisation of anhydrite in the manufacture of ammonium sulphate was not generally realised. Neither was the importance of large-scale operations, nor the economics of the process, fully appreciated.

In order to obviate any misconception concerning the anhydrite process, Mr. Parrish said that it was important to examine three pertinent questions: (1) In what form must by-product ammonia be recovered to admit of the application of the anhydrite process? (2) What were the unit processes involved in the production of ammonium sulphate from anhydrite? and (3) How did the cost of anhydrite, taking the extra unit processes involved into consideration, compare with the price of sulphuric acid?

Examination of the Anhydrite Process

By-product ammonia would need to be recovered as gas liquor, and by a simple distillation could be converted to concentrated gas liquor—a form in which it would be suitable to admit of the application of the anhydrite process. Concentrated gas liquor contained about 15 per cent. of ammonia (it should not contain more, otherwise difficulty might arise through solidification), usually as carbonates and sulphides of ammonium.

The unit processes were as follow: (*a*) Recovery of by-product ammonia as gas liquor; (*b*) distillation of gas liquor in the production of concentrated gas liquor; (*c*) recovery and purification of flue gases as a source of CO_2; (*d*) carbonatation of the ammonium sulphides of the concentrated gas liquor; (*e*) recovery of the H_2S released in the carbonatation process; (*f*) grinding and screening of anhydrite to a suitable size; (*g*) interaction of ammonium carbonate with calcium sulphate in a series of suitable vessels; (*h*) filtration of ammonium sulphate-calcium carbonate magma; (*i*) evaporation of ammonium sulphate solution and its subsequent crystallisation centrifuging, and drying; and (*j*) removal and treatment of calcium carbonate sludge.

Mr. Parrish then dealt exhaustively with these matters. The grinding plant required was of a special type. The reaction between anhydrite, concentrated gas liquor, and flue gases containing carbon dioxide required careful consideration. The separation of the ammonium sulphate from the calcium carbonate produced called for special comment. All the usual types of filtering plant had proved unsatisfactory, but the difficulty had been solved by the adoption of suction filters completely immersed in the liquors. When the anhydrite contained undue quantities of argillaceous material it was usual to submit the material to a preliminary calcination, which introduced another source of expense.

It was clear that the utilisation of anhydrite in lieu of sulphuric acid for the manufacture of ammonium sulphate was not nearly so simple a process as many were inclined to suppose. Many unit processes were involved; additional chemical supervision was necessary, and the efficiency of the conversion of the calcium sulphate content of the anhydrite to ammonium sulphate, the efficiency of the use of the CO_2 content of flue gases and of ammonia in the interaction, must be carefully considered. Regarding the matter from the point of view of chemical plant, a good deal more apparatus was required in connection with the anhydrite process than with that involving the use of sulphuric acid.

Plant Required for the Anhydrite Process

The anhydrite process involved crushing, grinding and screening plant; reaction vessels with agitators and suitable drives for the interaction; purification plant for the flue gases containing CO_2; special filter presses, together with vacuum producing plant for the separation of the calcium carbonate sludge from the ammonium sulphate solution; plant for the evaporation of ammonium sulphate solution, and rotary dryers for the treatment of the calcium carbonate sludge.

Where concentrated gas liquor was used, and sulphuric acid was the source of the SO_3 ion in the manufacture of ammonium sulphate, a gas liquor still with heat interchangers and coolers, and a saturator and equipment were the only plant involved.

As regards the question of cost, Mr. Parrish's calculations showed that, as between the anhydrite and sulphuric acid processes, there was, where anhydrite could be obtained favourably, a difference (per ton of ammonium sulphate manufactured) of 20s. 8d. where anhydrite could be obtained favourably, and of 8s. 8d. per ton where the gasworks was situated in London, or the equivalent, in favour of the anhydrite process. It was obvious, therefore, that the anhydrite process as an alternative to the use of sulphuric acid needed to be carefully considered. The nature of the process, however, necessitated a medium-sized scale of operations, and it was Mr. Parrish's view that plant to deal with *less* than 30 to 40 tons of ammonium sulphate per day would not be warranted.

Where the centrally situated chemical works was sufficiently large it would, perhaps, be advisable to consider a process which involved the manufacture of diammonium phosphate and calcium nitrate from (*a*) concentrated gas liquor, (*b*) ground phosphate rock treated with sulphuric acid in the manufacture of phosphoric acid, and (*c*) the utilisation of the precipitated calcium sulphate (which is really in a better form physically than anhydrite), in the production of ammonium sulphate.

Incidentally, the calcium carbonate produced from the latter process could be treated with nitric acid obtained by the oxidation of ammonia (Oswald process), to yield calcium nitrate and release carbon dioxide for the carbonatation process.

One such cyclic process, possessing distinctive features, had been suggested by Dorr-Liljenroth, and it was certain that more would be heard of the process in the near future.

The radius covered by any centrally situated chemical works treating concentrated gas liquor or ammonium sulphate solution should not be more than forty miles.

Ammonium Sulphate: Modified French Method of Production

ACCORDING to the *Chemiker-Zeitung*, the erection of factories in France for the production of ammonium sulphate and cement by the Leverkusen process has been held up, as it is thought possible to convert gypsum into ammonium sulphate as in the method of the Badische company, together with the simultaneous production of cement. M. Baud, the discoverer of the new method, carries out the reaction between gypsum and ammonia under a pressure of about one atmosphere in the presence of carbon dioxide and loam, which, by reaction with calcium carbonate, gives a sludge. This, after complete washing out of the ammonium sulphate, is heated to 1,500° C. whereby cement clinker of normal composition is formed. The solution contains 27-28 per cent. of ammonium sulphate. The German account states that a conflict is at present in progress between the producers of ammonium sulphate (who regard this as the best nitrogenous fertiliser) and the producers of calcium nitrate, who oxydise synthetic ammonia by the Bamag or Parsons method.

Merchandise Marks for Imported Copper Goods

THE Standing Committee under the Merchandise Marks Act, 1926, in a report issued on Friday, September 21 (Cmd. 3199, H.M. Stationery Office, 2d.), state that a case has been made out for an Order-in-Council requiring that copper plates, sheets, strips, rods, wire and tubes should bear an indication of origin at the time of sale or exposure for sale, and recommend that the Order-in-Council should come into force three months after the date on which it is made. The applicants were the Manufactured Copper Association, the High Conductivity Wire, Bars and Strip Association and the Brass and Copper Tube Association. It was stated on behalf of the applicants that it was almost impossible to distinguish between British made and imported goods of these descriptions and that, in the absence of an Order-in-Council, there was a substantial possibility that a purchaser might be unaware of the origin of the goods which he was buying.

The Production of Alcohol for Power Purposes

A General Review of the Situation

On Wednesday, before the Fuel Conference (World Power Conference), at the Imperial Institute, Colonel Sir Frederic Nathan discussed (in a paper abstracted below) the question of "Alcohol for Power Purposes."

SIR FREDERIC NATHAN said that he did not propose to give statistics concerning the past, present, and probable future requirements and supplies of petroleum, which was the raw material from which petrol was derived; or to consider the question as to how long the world's supplies of petroleum were likely to last. Of alternative fuels, the one that had received most attention for a considerable number of years was ethyl alcohol. In this paper the word "alcohol" signified ethyl alcohol of 95 per cent. by volume unless otherwise specified.

The principal reasons for the attention paid to ethyl alcohol, apart from the general suitability of alcohol for use in internal combustion engines were: (1) the relative ease with which it could be produced from vegetable materials containing either sugars or bodies easily convertible into sugars, and, (2) the fact that these vegetable materials were widely available and were continuously being renewed as a result of the sun's energy.

Suitable Alcohol Mixtures

Whilst many liquid fuels for internal combustion engines containing alcohol had been patented, the only ones (for practical purposes) that could be used in engines of existing design were those in which alcohol was combined with (1) benzol; (2) petrol, when it was necessary that the alcohol should be absolute alcohol to ensure miscibility in all proportions, especially at low temperatures; (3) petrol and benzol together, when miscibility was obtained if the right proportions were chosen; and (4) ether. In many of the Colonies and Protectorates, benzol was probably no more available than petrol. In such cases either absolute alcohol, or ether which was made from alcohol, would have to be employed, and this would entail further manufacturing operations and some reduction in the original quantity of alcohol.

Methods of Preparing Alcohol

Of the two methods of preparing alcohol, that by distillation—after they have undergone fermentation—of liquids from saccharine materials, dated back to ancient times, whereas the other method, its synthetic production, was a modern operation. In the first method, the raw materials were vegetable matter containing either sugar, starch (which had to be converted into sugar as a preliminary to fermentation) or cellulosic materials, the cellulose being converted by chemical treatment into fermentable sugars.

In the manufacture of alcohol for potable purposes, of which the requirements were comparatively small as compared with those for a liquid fuel, and for which a high price was obtainable, cereal grains, mainly maize, barley and rye were employed. In the production of industrial alcohol, molasses and maize in this country, sugar beets in France, and potatoes in Germany were the main raw materials used.

As giving some idea of relative quantities, the spirits distilled for all purposes in Great Britain for the year ended March 31, 1927, totalled approximately 22½ million imperial gallons of 95 per cent. alcohol, including 46,500 gallons for the manufacture of power methylated spirits; whereas imported petrol, and petrol produced in this country from imported crude petroleum, totalled approximately 750,000,000 imperial gallons. The alcohol equivalent of this quantity of motor fuel under the most favourable conditions of use would not be far short of 1,000 million gallons.

Possibilities in this Country

The possible raw materials that could be grown in this country for the production of alcohol for power purposes (apart from wheat, which was naturally out of the question), were:—(1) potatoes, (2) mangolds, (3) sugar beets, and (4) Jerusalem artichokes. Statistics indicated that for lack of acreage, irrespective of all other considerations, the production of any but an infinitesimal quantity of alcohol for power purposes would be an impossibility in this country. In fact, the availability and price of raw materials would make it impossible to manufacture alcohol for power purposes in quantity in this country from indigenous raw materials.

Position in Germany and France

In order to improve the agricultural value of the sandy soils of East Germany, potato growing on a large scale was inaugurated more than a century ago. The production of alcohol, mainly for industrial purposes, was one of the outlets for the surplus over food requirements. Scientific methods of agriculture improved the yield and starch content, and the manufacture of industrial alcohol was encouraged by subsidies and further fostered by powerful organisations controlling production and disposal. The result was that, during the later pre-war years, some 6,000 distilleries were producing on an average 66,000,000 gallons, or about 80 per cent. of the alcohol output of the country, using for the purpose about 2½ million tons of potatoes, or about 5 to 6 per cent. of the total potato harvest.

Since the war, the industry had been a monopoly of the State, which supervised production and distribution and fixed the sale price. It had, however, suffered severely as a result of the war and of frontier readjustments, so much so that in 1919-20 the number of distilleries had been reduced to some 1,500 with a production of 6.6 million gallons of alcohol, an output which was just one-half that from all sources. The position had not materially improved since then, and according to statistics of the German Monopoly Department 167,472 hectolitres (3,684,384 gallons) of alcohol were used in motor fuels, etc., in 1926-27.

The manufacture of alcohol from sugar beet had been practised in Northern France for over half a century. In 1913 the production of 181 distilleries was about 36½ million gallons, but the industry suffered heavily as the result of the war and had not yet recovered. In 1926 the output was a little over 13,000,000 gallons, of which some 6,000,000 gallons were used for motor fuels.

Possibilities in Dominions and Colonies

The position as regards the production of alcohol for power purposes in the Dominions, Colonies and Protectorates was somewhat more favourable than in the Mother Country, because the requirements of liquid fuels for internal combustion engines were small in comparison, suitable raw materials of the vegetable world were more easily produced, and the retail price of petrol was higher.

Possible materials were cassava, maize, molasses, nipah palm juice, and sweet potatoes. Cassava was grown in practically all the tropical and semi-tropical portions of the Empire, but entirely for food purposes. Its use for the production of alcohol for power purposes was considered, and cultivation experiments were carried out for some years on the Gold Coast, but the idea was abandoned on account of the cost of growing it. In Queensland it was being grown experimentally for supply to the Sarina Factory, near Mackay, of the International Sugar and Alcohol Co.

The production of maize in South Africa was on a very large scale, but it was a staple article of food. So far it would not appear to be a likely source of Empire power alcohol in any but very small quantities.

Production from Molasses

The principal sugar-growing countries of the Empire were Queensland and New South Wales, Mauritius, Natal, the West Indies and British Guiana. In Queensland and New South Wales the production of molasses in 1925-26 was about 118,500 tons, equivalent to about 8¼ million gallons of alcohol if it were all used for the purpose, but a considerable proportion, owing to locality of production, could not be treated. A factory had recently started at Sarina, in the Mackay sugar district of Northern Queensland, for the manufacture of alcohol for power purposes, using molasses as the main raw material, and at least two others were contemplated if the first was successful; the combined output of the three factories would be at least 3,000,000 gallons a year.

Plant for the production of alcohol for power purposes, with an estimated capacity of 150,000 gallons a year, was run

in conjunction with a sugar factory in the Buganda Province of Uganda. In Mauritius, attention had been devoted to the use of alcohol for power purposes for the last ten years, and a big factory for the production of an alcohol motor fuel at the rate of 1,000 gallons a day was erected in 1922, but it was understood that unexpected difficulties had prevented its working. At Merebank, in Natal, an alcohol-ether motor fuel called "Natalite" had been manufactured for some years from molasses; production being at the rate of 1,000,000 gallons a year.

Nipah Palm

The Philippines was the original home of the nipah palm alcohol industry, and from 1¼ to 1½ million gallons were made there annually, mainly for use as a beverage. There were over 300,000 acres of nipah palms in British North Borneo, and an experimental factory with an output of 200 gallons of alcohol a day was erected in 1923 to study the question of its manufacture. As the result of the data obtained, it was considered that in British North Borneo, under favourable conditions, nipah could be efficiently and economically exploited for the production of alcohol and a motor fuel, at a price sufficiently low to compete successfully with petrol.

In Malaya there were no compact stands of indigenous nipah, and an alcohol industry would have to rely on plantation nipah. Some large nipah palm estates existed, and experiments had been carried out since 1922 under the direction of the Agricultural Department. The results indicated an output of at least 1,000 gallons of alcohol an acre a year.

Production from Grasses, Straws, etc.

The possible use of grasses, straws and waste vegetable materials, and waste wood and sawdust, possessed the important advantages of high yields of fermentable material per acre, and of easy manufacturing operations, but the cost of operations must be relatively high, even under favourable conditions. In view of the quantities of grasses, and of waste vegetable products such as maize and rice straws, corn cobs, sisal hemp waste, etc., available in the tropical and semi-tropical portions of the Empire, the Fuel Research Board started investigations to discover a simple and cheap method of converting these materials into alcohol. The method tried was one in which some portion of the material could be converted into simple sugars capable of fermentation by bacterial action into a combustible liquid.

The investigations carried out with a number of grasses from different parts of the Empire, and with some waste materials, had resulted in the development of a method that, on a semi-technical scale, had given satisfactory indication of its applicability.

The process consisted in subjecting the material, after reduction to a suitable state of division, to a digestion in a 2 per cent. solution of sulphuric acid, removing the excess acid by pressure, steaming the impregnated material at atmospheric pressure in vats of wood or other suitable non-corrosive material, and subsequently cooling and neutralising the mash with lime. The fermentation of the mash was effected by means of the *Bac. acetoethylicus* of Northrop, the hydrogen ion concentration being carefully regulated throughout. The wash on distillation gave, per ton of raw material, an average yield of the order of 20 gallons of a liquid composed of about ninety parts of alcohol to ten parts of acetone, a very suitable liquid fuel for use in internal combustion engines. The production of alcohol by that process should present no manufacturing difficulties; whether it would be possible commercially must depend on a number of local conditions.

The process of production of alcohol from sawdust and waste wood could not be worked in this country owing to the lack of sufficient raw material. Difficulties of acid supply would probably prevent its use in the Colonies and Protectorates, but it might have application in Canada and possibly also in Austrialia. It might be operated in Norway and Sweden.

Synthetic Production of Alcohol

The development of synthetic processes for the manufacture of alcohol had not made any material headway, nor, in view of the somewhat complex nature of the processes, was there any great prospect that synthetic alcohol could be produced at a cost to enable it to compete with petrol. Using coal as a primary material, ethylene from coal gas and coke-oven gas was treated with sulphuric acid, the ethyl hydrogen sulphate produced being subsequently hydrolysed.

In conclusion, Sir Frederick Nathan was of the opinion that whilst it might be possible to produce alcohol commercially from vegetable materials, where conditions were favourable, to meet comparatively small local requirements, liquid fuels for internal combustion engines would continue to be obtained from petroleum, but where there was no indigenous petroleum then they must look more and more to coal as the basic raw material.

Discussion

Dr. G. Egloff (U.S.A.) referred to a new development in the United States, by which fermentation gases—largely carbon dioxide and hydrogen—were used for the high-pressure synthesis of alcohol. He believed that something like 30 tons of alcohol per day was being made from the gases from the fermentation of beet sugar, hitherto wasted. There was a vast amount of experimental work going on in the United States in connection with the making of alcohols synthetically, and many of the processes were at present laboratory curiosities. At the same time, about 5,000 gallons of isopropyl alcohol, used for solvents in the various arts, were being produced daily from the gases resulting from cracking processes. Twenty years ago, in St. Louis, and he believed also in Bohemia, ethyl alcohol was produced from the ethylene present in cracked acids. The fermentation process was much cheaper.

The special alcohols, such as isopropyl, butyl and isobutyl alcohols, had been and were still being produced commercially in the United States for various solvent uses. Other alcohols, such as the glycols, were produced from the cracking of natural gas specifically to produce ethylene, the latter being converted into glycol. The latter was sold in vast quantities in the States, not only for solvent uses, but also as an anti-freezing agent, replacing glycerine and other liquids, to prevent radiator water from freezing in cold weather. Plants were being built all over the country in an endeavour to supply the demands of the automobile industry. The A. D. Little Co., of Boston, had a plant at Tiverton making unsaturated hydrocarbon gas in order to produce the various alcohols useful for solvent purposes, ethyl alcohol being the least desirable one at this stage of demand in the United States.

Position in New Zealand

Mr. S. Irwin Crookes (New Zealand) drew attention to New Zealand flax (*Phormium tenax*) as a possible raw material for the production of power alcohol. It was used, he said, for producing a fibre for the manufacture of twine and various kinds of rope. The plant was very prolific and grew in enormous quantities, and in the production of the fibre for making twine or rope only one-eighth was used; i.e., out of every 8 tons of leaf collected, only 1 ton was used for fibre production. Thus there remained 7 tons of raw material out of every 8 tons collected which would probably be available at some time in the future for power alcohol production. In this connection he pointed out that New Zealand had to import its petrol and other power fuels at present. New Zealand flax grew to a height of 8 ft., and had large leaves; it could be cut down to the roots, but it regenerated every four years, so that its growth could be controlled with a view to obtaining a continuous crop.

Sir Frederic Nathan replied that New Zealand flax was one of the many growths investigated with a view to power alcohol production. The yield of alcohol was very small—he believed about 10 gallons per ton of material—and although it was prolific in New Zealand, it was not a plant of world-wide occurrence. In order to produce any appreciable quantity of alcohol enormous quantities of the raw material would be needed, and the cost of collection and handling of the waste from the scutching mills would prohibit any possibility of its being produced at a price at which it could compete with petrol, which was extraordinarily cheap.

Large New German Coke Plant

A LARGE COKE PLANT is being completed near Gelsenkirchen, Germany, for the United Steel Works. There will be a battery of forty-two coke ovens, each with a capacity of 30 tons daily. A further one hundred and twenty-six ovens are to be erected, when the daily output will be 5,200 tons of coke, sixty tons of benzole, eighty tons of ammonia and two hundred and forty tons of tar.

Among the Chemists of America

By Our Special Correspondent

The correspondent of THE CHEMICAL AGE *who has been travelling in Canada and the United States attended the meeting of the American Chemical Society at Swampscott. His notes are recorded below.*

R.M.S. Scythia, September 20.

WHEN the official tour of the chemical engineers and chemists came to an end in New York nearly a fortnight ago, it seemed impossible to expect anything quite so good as we had already experienced. We thought the peak had been passed and that a little decline was inevitable. But the visit to Swampscott for the annual meetings of the American Chemical Society marked, not a decline from the previous high standard, but a further advance upon it, and the experience proved a fitting climax to a tour of exceptional interest.

To begin with, it was a delightful change from the hot streets and buildings of New York to the rocky, picturesque, wooded shores of New England, where the traditions that the first British colonists brought with them still endure, and where the country and the types of people seem more English than in any other part.

When the majority of the party had left for their return journey, we lost no time in getting away from New York. Professor and Mrs. Thorpe caught the "Knickerbocker" express for Boston at noon. Owing to the confusion between standard time (which is observed by the railway companies) and summer time (which is adopted by the public) I missed this, and travelled, more appropriately, by the "Puritan," a couple of hours later. Travelling to Boston by the shore line, one caught some very beautiful glimpses of shore scenery, with attractive places bearing such names as New London, and crossing Boston by taxi from the North to the South station, one reached Swampscott on Saturday evening with nothing more exciting than the sight of two young men on the train rather the worse for liquor.

It was an experiment for the American Chemical Society to hold its annual meeting at a seaside resort, and I fancy, from all I saw and heard, that the experiment will be repeated. The beautiful New Ocean House, facing the Atlantic, was the headquarters hotel, and had been completely reserved for members, in addition to some half-dozen other hotels in the neighbourhood. The weather was delightful, and the bay, always interesting for its small craft, was additionally interesting on account of the presence, in honour of the meeting, of a United States warship, submarine, and seaplane, all of which were open to visitors.

The good impressions these things produced were confirmed by the cordiality of the welcome one received from everybody—in particular, from Dr. Esselen, the chairman of the local section, Dr. Parsons, the general secretary, and Dr. H. E. Howe, the head of the Society's editorial staff. On the Sunday, before the great pilgrimage had begun to arrive, we had the place nearly to ourselves, and we had a delightful morning run in Dr. Esselen's car—Professor and Mrs. Thorpe and myself—to Nahant Point, the residence of Senator Lodge, who led the opposition to President Wilson on his return from Europe; to Marblehead, with its pretty harbour, narrow twisting streets, old houses, rocky burial ground, and other memorials of the original colonists; to Lynn, where everybody seems engaged in the boot and shoe trade; and to many other points.

On the way we picked up Mrs. Carr, while Mr. Carr, disdaining assistance, decided to complete his tour on foot. Later in the week, other members of the British party appeared at Swampscott, among whom I noticed Captain and Mrs. Goodwin and Dr. Percy May.

At the symposium on "Nitrogen" it was a pleasure to renew one's acquaintance with Mr. Jasper Crane, of the Du Pont Co., well known in London as their former British representative. Mr. Crane is now president of Lazote, Inc., the subsidiary Du Pont organisation for the production of synthetic nitrogen products. Many of the American people met previously at New York were also present. I had expected a great gathering, but the actual dimensions of the A.C.S. annual meeting dwarfed all one's forecasts. Up to the day I left, I was told that 1,869 members had registered, and many of these had travelled from distant parts, involving train or motor journeys of three and four days. By the courtesy of the executive officers, I was invited to attend the private session of the council. It was a conference in itself, very business-like and united, handled perfectly by the President, Professor S. W. Parr, and the General Secretary, Dr. Charles Parsons, who was cordially re-elected for another period of office. In the general programme there were no fewer than 19 sections, several sitting simultaneously, and the papers contributed were somewhere between 400 and 500. At the general opening meeting contributions were presented by Professor Thorpe on "One Hundred Years of Organic Synthesis" and Mr. Carr on "The Control of Reactions in Organic Synthesis."

The size of the annual meeting, indeed, is becoming a problem. It is impossible for one delegate to cover more than a fraction of the proceedings, and impressive as the programme is, I believe that a movement is setting in in favour of compressing the proceedings within practical limits, by restricting the number of contributions and leaving more margin for adequate discussion. Owing to the excellence of the Society's publication organisation, the member gets the substance of the contributions in all sections with little loss of time, but the diversity is a little bewildering, and a feeling seemed to be fairly general that simplification would be a distinct gain.

What impressed one was not merely the size of the gathering, but the unity and enthusiasm of all the members. Large as the numbers were, they merged spontaneously into one great family, and on the evenings of the busier days, the Ocean House lounge, crowded with friends exchanging greetings, was as animated a picture as any great society reception. One secret of the success of these meetings is the democratic spirit of the Society. There is no official caste, no hierarchy, no rings or cliques; officials and members work for the Society, and the Society alone. And immense as the area is that the Society covers, diverse as are the types and interests that its membership includes, the central unity of the vast organisation is wonderfully simple and strong. At Swampscott, British visitors were received very warmly, and one would like to acknowledge the many personal courtesies received from old and from new friends. My last evening at Swampscott was spent in listening to the address of the American President, and it was pleasant to see British chemistry represented on the platform by Professor Thorpe and Mr. F. H. Carr.

One particularly pleasant experience befell me during the stay at Swampscott, and that was a day spent with Colonel House (the friend and confidant of President

Wilson), at his home at Wenham, Mass. The *Intimate Papers of Colonel House*, as readers of THE CHEMICAL AGE probably know, constitute the greatest and most intimate of all the great war diaries, and the last two volumes are to be published by Benn Brothers, the firm I represented, at the end of October. In such circumstances it was a special pleasure to meet this remarkable man, more deeply versed in war diplomacy, probably, than any other, and to spend a day with him in his beloved New England home. Colonel House is still a name and a power in American politics, and in his friendly attitude to England and in his adherence to the traditions of the old Puritan settlers he is typical of the New England stock, which has done so much to shape and stabilise the American people.

Delightful as the whole tour was, it was not unwelcome to find oneself on board that most comfortable of Cunard liners, *R.M.S. Scythia*. The return voyage was one of the most enjoyable one could have wished for, as regards both weather and company. The latter included a few members of the original party who, like myself, had remained beyond the official tour—Mr. Irwin-Crookes, a New Zealand chemical engineer, who joined the party at Niagara, is now in London for the power conference, and is making a world tour before returning home; Mr. P. Parrish, of the South Metropolitan Gas Co., and his three junior colleagues, Mr. G. H. Fuidge, Mr. C. H. Smith and Mr. R. F. Twist. We all took a certain part in the life of the ship. Mr. Parrish played brilliantly in the deck tennis tournament; Mr. Irwin-Crookes beat me, on the tape, so to speak, in the shuttleboard competition; all of them helped me, as chairman of the Sports Committee on board, to get a good programme together. And, finally, hearing that it was Captain Prothero's last voyage on the *Scythia* before taking charge of the *Berengaria*, we organised an address of congratulation, which Mr. Smith illuminated in very nice style, and which was signed by all the cabin passengers. The presentation of the address at the usual ship's concert was quite the event of the voyage.

I found that both Mr. Irwin-Crookes and Mr. Parrish were agreed on many points respecting the tour. They felt that it was too large in numbers to make works inspections easy, that the organised visits (though they were of great industrial interest) had added comparatively little to their technical knowledge, that their most profitable experiences occurred when they broke away from the party and made their own investigations, and that the chief value of the tour lay in the personal contacts established with American friends. On its social side, all were agreed that the tour had been a wonderful experience. But one cannot go into this matter now. In a concluding letter, it may be possible to put one's impressions through the sieve and sum up the main results. F. E. H.

Fertiliser Propaganda

WITH a view to carrying on an effective propaganda to popularise the use of artificial fertilisers among cultivators, several manufacturing firms have pooled their resources and established what is known as the Fertiliser Propaganda of India, Ltd. This organisation endeavours to keep in close touch with local agricultural departments. As a result of this common propaganda, the cost to the firms has gone down and the prices of artificial nitrogenous manures has been reduced, so that they have begun to be within reach of the ryots. The British Sulphate of Ammonia Federation and Nitram, Ltd., proposed to the Royal Commission on Indian Agriculture to make annually a grant of £50,000 for the establishment by the Government of India of a central fertiliser organisation, but the Commission disapproved of the proposal on the ground that the proposed organisation would thereby be suspect in the eyes of cultivators, and would thus be deprived of much of its usefulness.

Mr. T. Aikman on Nitrate Developments

British and South Pacific Trading Co. Meeting

AN extraordinary general meeting of the British and South Pacific Trading Co., Ltd., was held on Friday, September 21, in London, to consider resolutions increasing the capital of the company and also increasing the number of directors. Mr. T. Tertius Aikman (one of the managing directors) presided. He said that a scheme for the centralisation of sales in the consuming markets in Europe and Egypt had been carried out, with the approval of the Chilean Government. That company and three of the other most important distributing organisations had merged their interests and had formed a company entitled "Chilean Nitrate of Soda Distributors, Limited"—of which he had had the honour to be elected chairman—to consolidate and cheapen their selling organisations under one entity. That new company would centralise the sales of the group in all the world markets, excepting the United States and Japan, and they had received such a powerful backing from the producers that their combined quota had been fixed at approximately 51 per cent. of the production available for those markets, or a quantity, so far as Europe and Egypt were concerned, of about 920,000 tons. They had obtained a very satisfactory share for their own company in that organisation. As a result of the centralisation scheme, their business would in future be conducted on a commission basis, thus eliminating the risks of loss through unusual competition.

New Selling Organisation

According to the statutes of the central selling organisation, distributors with producers behind them were in an especially favoured position, and their board had therefore decided that it was necessary for the company to become, with a view to improving its future position, more largely interested in the producing industry, so that consignments might be assured to it commensurate with its increasing distributing capacity.

The prices fixed, with the approval of the Chilean Government, in consuming markets were so much more favourable in relation to their synthetic competitors than they had been for many years, that he felt convinced that the natural advantages which their article contained, as compared with its synthetic competitors, would result in a vastly increased consumption. He did not believe that their competitors could afford to reduce the prices they had already fixed, but, should they do so, it was gratifying to have the assurance of the Chilean Government that Chile would omit no sacrifices to protect her industry.

An important by-product of nitrate was iodine, the sale of which was controlled by a combination, in which Chile had a quota of approximately 80 per cent. The sales of this commodity in the past had amounted to about 800 tons per annum, and the profits which had accrued to the Chilean nitrate producers from the sale of this article had amounted to approximately £1,000,000 per annum, or equivalent to about 6d. to 8d. per metric quintal of nitrate produced. Every effort was being made to extend the use of this commodity, and the experiments which had recently taken place in connection with its usage in petrol would, if confirmed, greatly increase its consumption.

They were asking the shareholders to pass a resolution to increase the authorised capital of the company from £300,000 to £1,000,000 and to sanction an increase in the number of directors. They proposed to issue immediately £300,000 of this increased capital, and had already placed, subject to the passing of the above resolution, 225,000 shares at 28s. per share, and intended to offer to the shareholders the remaining 75,000 shares at the same price The new shares to be issued would rank *pari passu* with the existing capital of £300,000, excepting that they would only receive five-eighths of any dividend which might be declared for the current financial year.

The board intended to invite Mr. William Weir to join the board. Mr. Weir's firm would take up an important part of the capital which they proposed to issue. Since their last meeting, they had invested approximately £200,000 in private producing companies, making their total investments in those to date, about £335,000, and it was their intention to invest further sums as and when favourable opportunities occurred.

He then proposed resolutions increasing the share capital of the company and laying it down that the directors be not less than two or more than ten in number. The resolutions were carried unanimously.

The Chemist in the Power Station

By Technicus

In the following article, the writer hopes to illuminate what is, perhaps, a little-known or appreciated sphere of activity for the industrial chemist. The article should warrant the attention of both engineer and chemist, that of the former because he may be generally inclined, and this quite without prejudice, to regard himself as self-sufficient in activities pertaining to the operation and management of power plant, and that of the latter because his appreciation of the limits of his legitimate rôle may often be too restricted.

To the majority, the modern electrical power station would seem to be essentially the sanctuary of the mechanical and electrical engineer, and were the question to be raised, it would be generally assumed that the engineering staff of a station is sufficient by itself to attain and maintain the most efficient and economical operation of all the units of the plant in its charge, both individually and as a co-ordinated whole. Such assumption, up to a few years ago, would have gone unchallenged.

Arising largely, however, out of a growing appreciation on the part of station engineers of the many directions in which the controlling and advisory activities of the chemist can be of material assistance to them, there is an increasing tendency on the part of those responsible for the erection, organisation and operation of power stations to make use of the chemist over a very wide field, and stations are now to be found provided with well-equipped chemical laboratories, staffed by qualified and specially trained chemists.

The Functions of the Chemist

Their activities, directed towards certain aspects of plant operation, management and control, and to the supplies of materials necessary to the continued satisfactory operation of the plant, can have a direct effect upon economical working and maintenance and can facilitate the smooth and co-ordinated operation of the plant. They may be instrumental in avoiding expensive shut-downs and even serious mechanical breakdowns, for by instituting a routine programme of testing on certain materials and at certain points on the plant, the likelihood or development of troubles or of faulty operation can be prevented, or detected at an early stage, thus permitting the correction of the conditions, etc., responsible

It is the writer's purpose to present a survey of the wide and varied nature of the activities of the chemist employed in a modern power station, and to illustrate, in one direction at least, the compatibility of the engineer and the chemist. That the chemist has found the engineer indispensable in many of the technical aspects of his science is appreciated by both chemist and engineer, but the reciprocal assistance which the chemist is able to render to the engineer is not yet quite so fully appreciated by either party.

In the case here to be considered, the work of the chemist goes beyond the development and improvement of materials and processes and finds expression actually in the management, control and operation of engineering products designed purely for engineering purposes.

The Laboratory

The power station laboratory should be equipped primarily for routine testing of the types which will later be indicated, but facilities also should be provided for the undertaking of technical investigations, the need for which is certain to arise from time to time in connection with the various units of the plant and their operation. Problems and troubles may occur in any station, the elucidation and future avoidance of which cannot always successfully be undertaken by the engineering staff, as they may be essentially chemical in character.

The power station chemist needs rather a special training and experience, each of which must largely be self-acquired, since they are not catered for specifically in the universities or technical schools. His status on the station staff should be equal at least to that of the shift engineers. He should receive the official and personal support of the station superintendents, and should have free access to all parts of the plant at any time. He will schedule the activities of the laboratory and of its staff, and will inaugurate the necessary routine testing; and having obtained the approval of the superintendent on these points, he should be given a free hand to carry them into practice.

The laboratory activities, when fully organised, will fall roughly into the following groups:—

(1) Routine testing—(*a*) Of consignments of materials, (*b*) of materials in service, and (*c*) at various points on the plant.

(2) Advisory work in connection with improved operation and in the forecasting and elimination or prevention of possible troubles on the plant.

(3) Investigational work arising largely out of (2).

(4) The observation and maintenance of certain instruments, their calibration, etc.

(5) The keeping of certain records.

(6) The survey of all current literature dealing with subjects involved in the foregoing.

(7) In certain cases, the laboratory may have complete control over the operation of some units of the plant.

Fuel

In a large power station a considerable proportion of the activities of the chemical laboratory will be devoted to the examination of the fuel supplies. The fuel will generally be purchased at prices agreed upon on the basis of calorific value, perhaps also taking into account the ash and sulphur contents. There may be, therefore, daily consignments of fuel to sample and prepare for analysis. The representative sampling of a large delivery of coal is in itself a skilled operation, necessitating the working down of an initial collection of samples of large bulk to the single small and finely ground sample which is used for the actual analysis.

The determinations made on the fuel will include the calorific value by one or other of the bomb calorimeters, the ash, the volatile matter, the moisture content and perhaps the sulphur content as well. The significance of the calorific value and of the ash content is apparent as affecting the price of the fuel and its behaviour in the grates. The sulphur content also is of importance since, under the conditions of the combustion of the coal, the oxidised sulphur can combine with the alkali in the ash to produce alkali sulphates which may be responsible for serious corrosion on the furnace side of the boiler plates and tubes.

Acquisition and Filing of Data

The laboratory should be responsible for the recording and filing of all fuel data, including that obtained from the boiler house, and should act in an advisory capacity on the control of the boilers and grates from the point of view of the combustion of the fuel. Routine analyses of the ash at definite intervals may often be considered advisable as providing additional checks and data on boiler house operation and control, as well as the examination of the fuel for coking properties.

A further responsibility which should be vested in the laboratory is the safety of the coal stacks. The chemist should see to the insertion of thermometers in the stacks at suitable points, and arrange for their frequent inspection and the keeping of temperature records. Periodical examination of the flue gases may also form an item in the laboratory routine work irrespective of whether automatic recorders are installed or not.

If fuel oil is used either wholly or partially in the place of solid fuel, the duties of the laboratory in connection with fuel will not be materially modified, but they may be somewhat lighter. (See section on oils.)

It was often the custom, and is so even now, to make complete boiler-house operation tests when the plant is put into commission, and at such times subsequently as the station superintendent considers desirable. Such occasions are not welcomed by the station staff as a whole, necessitating as they do a very considerable amount of preparatory work of not too congenial a nature. If, however, the station possesses a laboratory which is conducted in the manner out-

lined with regard to the acquisition and recording of data, this latter will be available at any time and, in conjunction with the other station records, will enable any desired calculation to be made on any aspect of boiler operation or efficiency, whether with a particular fuel or over a particular period.

Oils

Where fuel oil is used, the purchase price will again be largely determined by the calorific value. The routine testing of consignments of this material will be confined principally to the determination of this value, together with a determination of the flash point and viscosity. Occasionally a more complete examination may be made, but for general purposes the above tests will be found to suffice. The representative sampling and the supervision of stocks of liquid fuel generally presents a simpler problem than is the case with coal.

With regard to other oils, the chemist's activities will be two-fold, first with reference to the purchase and acceptance of new supplies, and, second, with reference to the routine supervision of the oils actually in service. In the case of insulating oils, *i.e.*, transformer and switch oils, these will almost certainly be bought to a purchasing specification, and unless the station possesses a laboratory, it must either accept the supplier's test data on the oil or commission an independent analyst to examine and report on a representative sample of the consignment.

Insulating and Lubricating Oils

The tests carried out on insulating oils will include viscosity, flash point, dielectric strength, and sludging tendency, to which may be added, as directed by the situation of the station, or by the personal views of the superintendent or the chemist, the iodine value, the evaporation and cold tests and the sulphur content. These tests will all be made in line with the specifications laid down for them.

The same type of activity holds good for lubricating oils, which will be purchased and tested according to definite specifications. The tests carried out on lubricating oils will differ, of course, in some respects from those made on insulating oils. A turbine lubricating oil, for instance, may be tested for its emulsifying properties, and for its lubricating characteristics. It would not be tested for dielectric strength nor for its sludging tendency, although, with regard to the latter, there is something to be said in favour of the development of a suitably modified form of sludge test for lubricating oils. The supervision of the oils in use would assume the form of, say, a fortnightly or monthly routine examination of the insulating oils in the transformers and switches and of the turbine lubricating oils. This examination would not require to be a full or complete one as in the case of new supplies, but certain tests, such as the determination of acidity and of dielectric strength, would be made with a view to ascertaining the condition of the oil, and the need, if any, for treatment or renewal. In a large station where there are a number of transformers and several turbo-generating sets, even a monthly routine of this kind may result in the laboratory having to deal with several oil samples per week.

On the results so obtained the laboratory will advise as to the need for filtering, centrifuging, or completely renewing any of the oil in service, and will be able to detect the presence of any irregularities in the plant, not necessarily arising from the oils themselves, but affecting them and their proper service and ultimately, therefore, the plant units. Lubricating greases may often escape examination in the laboratory; the quantities used are relatively small, and they are less apt to be associated with or held responsible for faulty operation or for more serious troubles. Nevertheless, where a laboratory is available, it is desirable to have an opinion expressed on the material in use and to compare it with competitive samples, as an inferior grease can readily result in mechanical troubles which, if not vital to plant operation, may cause serious inconvenience.

Water Supplies

The laboratory work in connection with water will be of very considerable magnitude, involving a comprehensive series of daily routine tests, some at various points about the plant itself. This will be readily understood when it is remembered that the maintenance of boiler and of cooler and condenser efficiencies may be influenced to a considerable extent by the water supplied to them, and that corrosion in any part of the steam-raising or power plant is, if and when it occurs, almost certainly attributable to the condition of the water supplies employed.

In the first place, the nature of the water supplies used on the station for various purposes should be known in order that a policy based upon the characteristics of the water may be decided and followed. Periodical examinations of these supplies should be made so that, in the event of variations occurring in them, it may be ascertained whether these are of a temporary or of a permanent character. If the latter, then the original policy will have to be modified to meet the altered nature of the supply, and if the former, the cause of variation may be traced and corrected or, if correction is not possible (*e.g.*, as in the case of seasonal changes affecting the supplies of condenser circulating water and boiler make-up water), then these variations may be legislated for.

To illustrate this section we may consider three different cases :—

(1) Where the raw supply is fed direct to the boilers as boiler-feed or make-up.

(2) Where the raw supply is softened.

(3) Where the raw supply is evaporated.

It should be a function of the chemist to assist the boiler house in determining the maximum saline concentration of the boiler water permissible without involving the risk of priming or foaming. In this matter, a limit will be fixed by the laboratory on the boiler water concentration, and, knowing the characteristics of the boiler-feed or make-up water, the percentage blow-down necessary to prevent the boiler water concentration exceeding this limit will be calculated, and the boiler house will be advised accordingly, as well as to the necessity for emptying and cleaning when this arises.

If variations in the composition of the feed or make-up occur, as evidenced by the periodical examinations of the supply, then the boiler house can be advised as to the corrected blow-down thereby necessitated.

In case (2), where a softener is installed, the control and operation of this unit is essentially a laboratory activity. This may entail a frequent examination of the raw water in order that the softening chemicals may be correctly apportioned. Also, the laboratory should test the new consignments of softening reagents with the same point in view, namely, correct apportioning. The existence of a softening plant will not preclude the activities detailed in the preceding paragraph.

In case (3), where the make-up is evaporated, the quantity of solids deposited in the evaporator per unit of time or per 1,000 gallons evaporated will determine the frequency of cleaning or descaling or the percentage of continuous sludging if this should be the practice adopted. Here again, the desirability of being cognisant of any changes in the character of the make-up supply is obvious.

Bi-weekly or even daily examinations (as circumstances dictate) of the boiler water for alkalinity and/or salinity should be arranged for in addition to the foregoing.

Examination of Steam

Reasonably frequent examinations of the steam should be made by sampling direct from the steam range through a condensing apparatus of, say, a pyrex glass cooling coil. The quality of the condensed steam may then be determined in a routine manner. For instance, a conductivity test will indicate the freedom from or the occurrence of priming and the resultant transference of corrosive salts from the boilers to other units of the plant. This sample may with advantage also be tested for free dissolved oxygen, and in this event, the sample must be collected in a manner which will ensure its inability to acquire oxygen from the atmosphere or to lose any of the oxygen it may initially contain. This, as will be indicated later, may form one of the important series of tests for aeration in plants employing closed systems or other means of de-aerating the water supplied to the boilers and, consequently, the steam supplied to the turbines.

A similar routine examination should be made on the condensate, where a conductivity test may also be employed as a rapid and reliable means of ascertaining both freedom from and the extent of condenser leakage should the latter occur. The circulating water ought also to receive periodical examination, as sudden alterations in its composition may lead to corrosion troubles with respect to the condenser tubes.

De-aeration of Water

Equipment is almost certain to be provided in a large station for de-aerating the boiler-feed or make-up water according to the lay-out of the plant and the mode of de-aeration. If a closed system is adopted, then the make-up only requires degassing; if the system is not a closed one, then the whole of the boiler feed will require degassing. This latter case, however, is not likely to be met with in a large station. In either case the laboratory should institute a programme of daily tests for aeration at suitably chosen points on the plant to ensure that the de-aerating equipment is operating satisfactorily and that air is not being picked up at any point.

This procedure will necessitate sampling at such points as the delivery of the de-aerator, the condenser extraction pump, the feed pumps, the sealed hot-wells and, if considered to be of advantage, the condensed steam drawn from a point as near as possible to the turbine stop valve. When sampling at a pump, it may be desirable to test samples drawn from both the suction and the delivery sides of the pump, since aeration can occur in a pump, particularly if the suction side is under reduced pressure as in the case of the condenser extraction pump.

Some stations may employ the chemical method of degassing, in which the dissolved oxygen is removed from the feed water or make-up water by passage through a chamber filled with a readily corrodible form of iron turnings. Such a unit would, like a softener, come entirely under the laboratory charge for supervision and control.

From the foregoing it is possible to form some conception of (1) the routine activities of the laboratory, (2) some of the directions in which it can act in an advisory capacity, and (3) the nature of the records for the compiling and filing of which the laboratory should be responsible.

Investigational Work

The laboratory will be available to examine and investigate all boiler troubles and phenomena attributable to either fuel or water (and by "boiler" is implied the whole steam-raising system, viz.: economisers or feed-heaters, boilers, and superheaters), such as scaling, priming, corrosion, poor combustion, boiler inefficiency, etc. Again, troubles may arise in other parts of the plant such as, for instance, corrosion, and these likewise will be submitted to the laboratory for investigation. All problems originating from or affecting insulating and lubricating oils and the preservation of cleanliness of operating conditions of electrical machinery and equipment are further items in the laboratory's sphere of activity.

The station chemist might, with advantage, be consulted as to the best means to adopt and the best materials to employ in preserving the metal work and other fabric of the station and plant, both structural and mechanical, and whether subjected to temperatures about or greatly removed from that of the atmosphere.

Miscellaneous items such as, for example, packing materials, should pass through the laboratory for criticism and recommendation or rejection, the verdict being reached perhaps, as in the case cited, from a joint consideration of the engineer's and chemist's individual views.

The chemist should exercise some supervision over the plant generally, and whenever a unit is opened up he should make an inspection and record the findings affecting the chemical aspect of the case. In this way it may be often possible to detect the development of troubles or of irregularities, etc., and to legislate against their continuance or growth. Again, an inspection of one unit may provide evidence of the need for vigilance with respect to some other unit or units.

Maintenance of Instruments

That the laboratory should assume responsibility for the maintenance and periodical calibration of instruments such as the carbon monoxide and dioxide recorders and the mercury type of barometric gauges will be readily appreciated. Similarly, with regard to thermometers and pyrometers, periodical calibration and the issue of correction charts should be a laboratory procedure. The stock of these instruments may be held, with advantage, by the laboratory, where they will be calibrated and issued as required, together with a chit stating the corrections, if any, to be applied to the readings observed.

The cleaning and refilling of mercury-filled gauges, involving probably also the chemical cleaning and purification of the mercury, should be carried out by the laboratory, and apparatus can readily be acquired which will permit of the calibration of the ordinary type of steam and other pressure or vacuum gauges.

Recording conductivity-measuring instruments are now available for installation in connection with the salinity of the feed-water and of the condensate, etc., and these, as well as the more recently available dissolved-oxygen recording instrument to indicate the extent of or the freedom from aeration of the boiler-feed, should be in the laboratory's charge.

In conclusion, it is scarcely necessary to add that the chemist in charge of the laboratory will keep himself familiar with developments in all matters affecting his activities. This will entail a careful and regular scrutiny of a fairly wide range of current technical literature.

Health Minister's Circular on Pollution

THE Minister of Health has addressed a circular to county, town, urban district and rural district councils calling their attention to the report and recommendations of the Joint Advisory Committee appointed by himself and the Minister of Agriculture to study the pollution of rivers and streams. The circular points out that under the Local Government Act, 1888, the Minister of Health is empowered, on an application by the council of any county or county borough, to set up by Provisional Order, subject to confirmation by Parliament, a Joint Committee or other body for the prevention of pollution over a wide area, and to confer on that body all the powers of a sanitary authority under the Rivers Pollution Prevention Act, 1876. The Minister will be glad if each county council and county borough council which is not now a constituent member of a joint body for the prevention of pollution will immediately consider the advisability of making an application under this Act. Consideration should not, however, be confined to areas where pollution exists. It is important to realise that similar action may be necessary in the case of areas which are not at present threatened, but may be confronted with the problem in an acute form, seeing that industries which give rise to pollution are being established upon rivers and streams hitherto relatively free from pollution.

The I.G. and Lithopone Manufacture

THE formation of a trust is taking place in the German lithopone industry, whereby the manufacture of this substance will be rationalised by concentrating it in the hands of a few large firms, the small works being put out of commission. The chief actors in the matter are the I.G. Farbenindustrie A.-G. and the Aktiengesellschaft für Bergbau und Chemische Industrie Sachtleben, who between them control the greater part of German lithopone manufacture. With this end in view, the Sachtleben company bought the Farbwerke Honningen, closed the factory, and transferred the work to Homberg, while the I.G. similarly paid a year's compensation to the firm of H. and E. Albert in order that the works of the latter in Fürfurt should be closed down, the production being taken over by the I.G. The I.G. and the Sachtleben company have jointly acquired the majority of the shares of the A.-G. für Chemische Industrie Gelsenkirchen-Schalke, which had just erected a new plant, while the Lithoponefabriken Chemische Fabrik Marienhütte in Langelsheim, the Aktiengesellschaft für Lithoponefabrikation in Triebes, and Bourjau and Co., in Schöningen, have come under the same control. The sale of lithopone has been centralised in Cologne, and numerous independent German dealers have lost their customers.

Increased U.S. Tariff on Barium Carbonate

THE cost, in the United States, of producing precipitated barium carbonate used in the manufacture of enamel wall paints and optical glass, exceeds the cost of production in Germany, the principal competing country, stated the United States Tariff Commission, in a report to President Coolidge. Accordingly the president, upon the findings of the Commission, proclaimed a 50 per cent. increase in the tariff. The Commission's report resulted from a cost of production investigation which it instituted upon applications from the Bertha Mineral Co., of Newark, N.J.; the Barium Reduction Co., of Charleston, W. Virginia, and the Chicago Copper and Chemical Co., of Blue Island, Illinois.

Report of Fuel and Power Committee.

Some Important Recommendations

THE National Fuel and Power Committee, with Lord Melchett as chairman, appointed by the Board of Trade in August 1926, to consider and advise upon questions connected with the economic use of fuels and related matters, has just issued its first report (H.M. Stationery Office, pp. 37, 9d.). The report deals with the subject generally.

The committee states that representatives of the Department of Scientific and Industrial Research discussed with it the work of the Fuel Research Board, referring particularly to the progress of the Survey of the National Coal Resources, the low temperature carbonisation of coal, and the experiments in the hydrogenation of coal. With regard to the latter, it is well known that an experimental plant has been at work at the Fuel Research Station for some time, and that a typical British coal has, on an experimental scale, yielded a liquid fuel. Great hopes are entertained of this process, or an adaptation of it. The Committee understands that whereas no great amount of success has been attained on the Continent in hydrogenating bituminous coal, very considerable progress has been made with the hydrogenation of lignite or brown coal.

The Training of Fuel Technicians

Suggestions were made to the Committee by many witnesses that if fuel questions are to receive in industry the attention they deserve, there is a danger that the supply of men of ability who have specialised in work of this kind will be insufficient. One of the representatives of the Department of Scientific and Industrial Research, in discussing the Survey of the National Coal Resources, said that the progress of the survey had been considerably delayed over the question of staff. The Treasury had provided the funds necessary to carry out the survey, and the junior staff had been easily obtained. But in each of the local centres that are undertaking the survey, an experienced man is wanted to take charge, and the difficulty is to get experienced men of the right kind of outlook to carry out that work properly.

The question of research staff was also brought to the notice of the Committee by a representative of the National Federation of Iron and Steel Manufacturers. He expressed the view that the questions of fuel control require a class of man not developed to a great extent in this country, and a representative of the Federation of British Industries took substantially the same point of view when he said that "improved training of all classes engaged in the use of fuel—the workman, the works engineer or plant superintendent, and the trained fuel technologist—is necessary." The representative of the Institution of Gas Engineers went still further. He told the Committee, as his personal opinion and as applying to the fuel industries generally, that the best results of research work will never be obtained until the creation of a scientific executive personnel has been brought about.

Co-operation with the Universities

The Committee is of the opinion that while the matter may not be strictly within its terms of reference, it is satisfied that the most economic use of fuels is largely dependent on a highly trained personnel. For that reason, it has referred at some length to the views on the subject that were put before it. The matter is one in which the industries should, in their own interests, take the initiative, and the Committee recommends to the consideration of industrial leaders not merely in the fuel producing industries, but also in the fuel consuming industries, the need for co-operation with the universities in this matter. It appears to the Committee equally desirable that the Board of Education should consider what might be done in the institutions supervised by them to contribute to the training of men with the desired qualifications.

Disposal of Coke-Oven Gas

Representatives of the various interests in the coke-oven industry were of the opinion that it was very important that the industry should obtain a profitable outlet for its surplus gas. One of the directions which suggests itself is by use for town's purposes. In a number of cases, coke oven owners and gas supply authorities have come to an arrangement of this kind. Proposals are often made for the use of coke oven gas for town's purposes which involve transmission of the gas for considerable distances by pipe-lines. Gas has been for some years carried from the Ruhr district in Germany some 40 miles, and there are now proposals for a system of large gas mains extending over 150 miles. The desirability of such a system in Germany depends, for example, on the fact that many German towns obtain their gas coal from distant sources and even from foreign countries. The same considerations do not apply with anything like the same force to towns in Great Britain.

In recent years also developments of this kind have been taking place in Belgium and Northern France, and it seems at least likely, in the opinion of the Committee, that, in some of the industrial districts on the Continent that bear the closest resemblance to our own industrial districts, development is in the direction of the construction of a network of gas mains bearing some resemblance to the projected national electricity supply network in this country, the network being fed by gas produced mainly at coke ovens.

A Government Survey Suggested

It is impossible, on the evidence before the Committee, to say whether a gas network of this kind (fed by gas works, coke ovens, and the like) would be useful in this country as a whole, or in particular districts. The industrial interests involved are varied and consist of a large number of independent units, and the Committee sees no likelihood of a survey of the question of the necessary width being made except by the Government. Such survey should also consider the disposal of the coke, the location of coke oven plants with respect to iron and steel works, and the existing and potential consumption of coke, whether for the iron and steel industry or for domestic purposes. The Committee thinks that the time has come when such a survey is essential to the future development of some of our fuel industries, and recommends that it should be undertaken by the Government. It is suggested that the investigation might in the first place be confined to an area such as that lying between the Humber and Liverpool and between Leeds and Birmingham.

Government's Prompt Action

In connection with the above report, it is of interest that Sir Philip Cunliffe-Lister, President of the Board of Trade, speaking on Monday at the banquet given in connection with the Fuel Conference at the Connaught Rooms, London, announced that the Government proposed to undertake the inquiry into the use of surplus coke-gas in the industrial areas suggested by the Fuel and Power Committee. He felt sure, he added, that the Government could count upon the co-operation of the various industries concerned.

Important New Wood Pulp Process

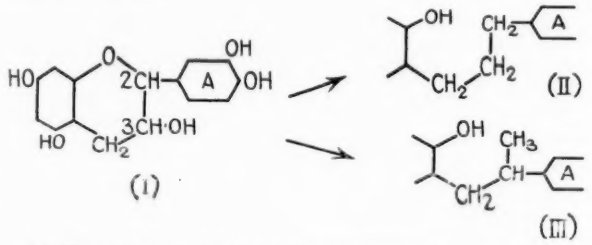
AN important new process for the production of wood pulp is now being developed, states *Nature*. An ideal method undoubtedly is to boil the raw wood under pressure with caustic soda solution, so that the lignocelluloses are dissolved and almost pure cellulose left as a pulp, ready for paper making, artificial silk manufacture, and so on. But hitherto the residual liquor, known as "black lye" has been a waste product. Dr. Erik L. Rinman, a Swedish chemist, aided by an English engineer, has now found a method of utilising this "black lye." The latter is evaporated down *in vacuo* to a treacle-like product, which is then carbonized at not above 750° F. in retorts, giving a whole series of valuable products, including methyl alcohol, acetone, methylethylketone, acetone oil, light tar oils, heavy tar oils, and turpentine. The residue from the retorts, known as "soda coal," consists essentially of sodium carbonate and free carbon, and is burnt on a special new design of mechanical stoker, which consumes more than 97 per cent. of the carbon, the heat being used for steam generation, while the sodium carbonate is extracted with water and reconverted into caustic soda. A large plant on these lines is now operating under the superintendence of Dr. Rinman at Regensburg in Bavaria, with water from the Danube, turning out 600 tons of pulp a month, while extensions are being carried out to give 2,000 tons a month. A British financial group is now to develop the process throughout the world in association with the original company, Aktiebolaget Cellulosa of Stockholm. A production of 1,000 tons of "Kraft" pulp is stated to result also in 25 tons of methyl alcohol, 18 tons acetone, 18 tons methylethylketone, 12 tons acetone oil, 8 tons light oil, and 50 tons heavy oils.

The Catechin Problem

To the Editor of THE CHEMICAL AGE.

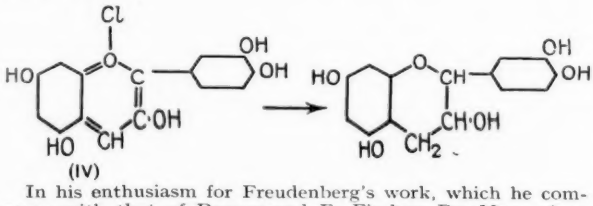
SIR,—I have read with great interest the recent summary of Freudenberg's work on catechin, by Dr. F. A. Mason (*Jour. Soc. Chem. Ind.*, 1928, **47**, 269), who shows that the Perkin formula (I) for catechin is based on the following experimental results obtained by Freudenberg :—

(1) The reduction of catechin to an α, γ-diphenylpropane derivative (II).



(2) The existence of six stereoisomeric catechins as required by the two asymmetric carbon atoms 2 and 3 in Perkin's formula (I) for catechin.

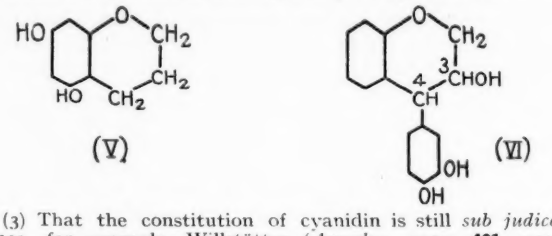
(3) The production of *dl*-epicatechin from cyanidin chloride (IV).



In his enthusiasm for Freudenberg's work, which he compares with that of Baeyer and E. Fischer, Dr. Mason has, however, overlooked the following facts, which obviously invalidate these arguments :—

(1) That Freudenberg has shown (*Annalen*, 1925, **446**, 87) that the catechin-skeleton also yields an α, β-diphenylpropane derivative (III) on reduction. Since thus, according to Freudenberg, the A-nucleus in catechin is mobile, nothing whatever can be deduced from these experiments as to the constitution of catechin.

(2) That the existence of six stereoisomeric catechins is in agreement with *any* catechin formula derived from a chroman nucleus (V), substituted in the positions 2, 3 and 4, by two different radicals. Freudenberg's experimental date are thus in perfect agreement with my formula for catechin (VI), in which the two carbon atoms 3 and 4 are asymmetric.



(3) That the constitution of cyanidin is still *sub judice*, since, for example, Willstätter (*Annalen*, 1913, **401**, 231) has shown that cyanidin chloride may be oxidised to a well-defined yellow substance, whereas no such oxidation product could be obtained by Robinson (*Jour. Chem. Soc.*, 1925, **127**, 172) from synthetic 3, 5, 7, 3′, 4′-pentahydroxy-flavylium chloride (IV, synthetic cyanidin chloride). The production of these yellow oxidation products is common to the natural anthocyanidins (compare, for example, Combes, *C. R. Acad. Sci.*, 1913, **157**, 1002, 1454), but it has so far not been shown by Robinson that any of his synthetic anthocyanidins can be oxidised to such a product. Since therefore the constitution of cyanidin is far from being established, nothing whatever can be deduced from it as to the constitution of catechin.

However, since Dr. Mason is so keenly interested in the Perkin formula I would suggest that he repeats Freudenberg's reduction with synthetic 3, 5, 7, 3′, 4′-pentahydroxy-flavylium chloride (IV), to that mysterious substance "*dl*-epicatechin," and compares it with the natural product, obtained by him according to Freudenberg's method. As a member of the University of Manchester, Dr. Mason will probably easily obtain the necessary 3, 5, 7, 3′, 4′-pentahydroxy-flavylium chloride from Professor Robinson, whereas I shall be very pleased to supply him with acacia wood and cube gambier for the preparation of *dl*-epicatechin.

In conclusion, I wish to point out that although my own work on catechin is in every way in disagreement with the Perkin formula, I have not drawn upon it in the above criticism.

Yours, etc.,

M. NIERENSTEIN.

The University,
Bristol.
September 24.

Professional Unemployment

To the Editor of THE CHEMICAL AGE.

SIR,—Members of the profession in general will doubtless be interested in the position of the Unemployment Benefit Fund of the British Association of Chemists, since insurance against unemployment is obviously a matter of interest to all chemists. A considerable period has elapsed since any communication to the press has been made upon the subject, but the improving financial resources of the fund justify a further report upon it.

Since its inception, the fund has paid out in benefits more than £4,500, which, having regard to the relatively small number of subscribers, is considered by the Council as very satisfactory. Since the revision of the rules, the unit subscription is now 30s. annually, but since this entitles the unemployed subscriber to a grant of 17s. 6d. per week for six months with corresponding increases for increased units, it will be allowed that a satisfactory return is guaranteed. It is desirable to stress the fact that the scheme contains no element of charity whatever. The unemployed member, provided his case is bona fide, has a right to the grant, excepting of course such cases—and the committee has never yet had an example before them—where unemployment has been due to professional misconduct or to the applicant's having lost an appointment by his own fault, or by resignation for some trivial cause.

In administering the fund, it has been our experience that many of those whose employment has appeared most secure and whose professional abilities are beyond all question, have had reason to be glad that they have given the fund their support, and there is no substance at all in the opinion that in a scheme of this kind, the less are supported at the expense of the more efficient. The assistance provided by the fund has further had the valuable result of, in many cases, making it possible for an applicant for a post to negotiate for a salary and conditions appropriate to the chemist's professional status ; or actually to refuse conditions of employment which would ultimately do both the profession and himself more harm than good.

From the wider point of view, the fund is a living and growing example of what can be accomplished in a society where professional fellowship is a very definite reality. Without this sense of professional fellowship the fund would not have been initiated or developed, and its increasing strength is but a symbol of a new and better spirit of professional solidarity.—Yours, etc.,

HENRY T. F. RHODES.

British Association of Chemists,
Empire House, 175, Piccadilly, London, W.1.

Chemical Society Lectures

THE programme of the Chemical Society for the session 1928–1929 includes the following lectures, all of which will be delivered at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1, at 5.30 p.m., on the dates stated : Thursday, November 29, 1928, the Liversidge Lecture, by Professor F. G. Donnan, F.R.S. ; Thursday, April 25, 1929, the T. W. Richards Memorial Lecture, by Sir Harold Hartley, F.R.S. ; Thursday, May 30, 1929, the Pedler Lecture, by Professor W. A. Perkin, F.R.S. The annual general meeting of the Society will be held at Leeds on Thursday, March 21, 1929, at 4 p.m., and the anniversary dinner will be held the same evening.

Chilean Nitrate Sales

Text of Regulations for Great Britain

THE Chilean Nitrate Producers' Association has issued regulations for the centralised selling of nitrate in Great Britain and Ireland. The regulations are as follows :—

1. The authorised distributors shall hold stocks in the principal ports of Great Britain and Ireland under arrangements determined in Valparaiso.

2. The prices at which 95 per cent. nitrate of soda shall be sold in lots of not less than 6 tons shall be as follows :—

Per ton of 2,240 lb. gross weight delivery free on railway waggon at any station in Great Britain selected by the buyer, payment net cash on or before delivery at seller's option :—

	£	s.	d.
September delivery	10	0	0
October ,, ...	10	2	0
November ,, ...	10	4	0
December ,, ...	10	6	0
January ,, ...	10	8	0
February ,, ...	10	10	0
March ,, ...	10	12	0
April-June ,, ...	10	13	0

The price charged shall be the price corresponding to the month when delivery actually takes place.

3. For delivery in any Irish railway station, prices 10s. per ton higher shall be charged.

4. Retail lots shall be sold at the prices fixed for 6 tons plus the following surcharges per 2,240 lb. :—

	£.	s.	d.
Lots of 1 ton upwards but under 6 tons	0	5	0
Lots of 5 to 10 sacks	0	10	0
Lots of 1 to 4 sacks	0	15	0

5. Whenever the nitrate sold is of a special quality such as 96 per cent. nitrate or potassium nitrate a surcharge shall be separately stated on the invoice.

6. Whenever a sale is made on credit, an additional charge must be made and separately stated on the invoice, sufficient to cover the interest incurred at the rate of not less than 8 per cent. per annum.

7. All dealers in nitrate of soda must undertake to sell at the exact prices, and under the exact conditions fixed in Clauses 2 to 6, without any rebate or allowance of any kind to the buyer.

8. All dealers in nitrate of soda shall prominently display the advertising material supplied to them by the Chilean Nitrate Committee.

9. In accordance with Article 17 of the directorate's scheme, if any reduction is hereafter agreed upon of the prices fixed in Clause 2, an equivalent bonus shall be allowed upon nitrate purchased under this scheme which is in the hands of an "approved dealer" at the time the reduction is made. Co-operative associations and industrial users of nitrate are included in the term "dealer."

10. Approved dealers are those dealers in nitrate who faithfully observe the rules regarding selling prices and conditions laid down in this scheme and who, in all other respects, carry on their business to the satisfaction of the Association. Such dealers must at all times give facilities for the inspectors and accountants employed by the Association to inspect their books and records. The Association may at its sole discretion at any time remove the name of a dealer from the approved list without giving any reason.

11. All contracts shall be headed "Subject to the Regulations of the Chilean Nitrate Producers' Association issued on September 14, 1928."

The Government Chemist's Report

THE report of the Government Chemist on the work of the Government Laboratory has just been issued. The total number of samples examined during the year was 491,039, an increase of 21,397 on the previous year. Owing to the application of Preservatives Regulations to such foods as butter and cream there has been a large increase in the number of samples examined in this connection. Work resulting from the Safeguarding of Industries Act has also shown a considerable increase, the number of samples examined being 11,579, as compared with 10,071 in the previous year. The Silk Duty samples have fallen in number from 22,179 to 20,915, but owing to the chemical nature of the questions arising the work involved has been greater. A more extended account of the report will appear next week.

French Coal Tar Production in 1927

THE French production of coal tar in 1927 totalled 487,000 metric tons, as compared with 465,000 metric tons in 1926. The output from gasworks decreased, while that from coke furnaces increased substantially. The increase was due to the lighting of the new batteries in the North and the East. As the French consumption of metallurgical coke is greater than the domestic production, additional batteries are under construction. Tar production by gasworks and cokeries in the Saar basin amounted to 116,000 metric tons in 1927, as compared with 106 tons in 1926. Under the Dawes plan the French highway administration has contracted for the purchase of important quantities of tar in Germany, and during the past year imports from this source reached 41,000 metric tons, of which 36,000 tons were prepared and the remainder crude. French exports of tar were limited to the territories of North Africa and the French colonies, the total being 13,000 metric tons. Among the derivatives of tar, creosote has been produced in abundance in France. As the railways have been unable to absorb the total, licences have been granted for the export of the excess. A French group of "Producers-Exporters" has been formed to follow the foreign markets and develop outlets for the surplus production. The production of benzol by the French gas plants, cokeries, and distillation units advanced from 53,300 metric tons in 1926 to 61,200 metric tons in 1927. The utilisation of the product was as follows :

	1927 Metric tons	1926 Metric tons
Benzol 90 and 50	24,300	22,500
Benzol (motor)	20,000	13,400
Toluol	2,300	1,200
Solvent	6,000	4,900
Benzine, toluene, xylene	3,000	2,450
Light oils (crude products)	5,600	8,800
	61,200	53,250

For the defence of their interests, the producers of benzol in France have formed a special organisation called "Union Française des Producteurs du Benzol."

Fertiliser Manufacture in British Columbia

A 35-TON-PER-DAY sulphuric acid plant, now being erected at Trail, British Columbia, by the Consolidated Mining and Smelting Co. of Canada, is an indication of progress in two directions, the one being the further reduction of the chemical content of the smelter fumes, and the other, preparation for the expected manufacture of superphosphate fertiliser. The company's first sulphuric acid plant, erected in 1916, makes its product by burning pyrite ore. The new sulphuric acid plant, which will be in production by the end of this year, will turn out 35 tons daily of 100 per cent. acid, utilising sulphur dioxide fumes in the zinc refinery. The company's engineers have discovered very large beds of phosphate rock in the vicinity of Fernie, British Columbia, and this year, triple phosphate fertiliser has been despatched from the Tadanac plant to points in the Prairie Provinces, where tests have been made by farmers. If a demand should be created for fertiliser produced at the plant, it is contemplated that the tailings at Kimberley will be used as the basis of a larger supply of sulphuric acid for manufacturing superphosphate.

New and Secondhand Drums

VICTOR BLAGDEN AND CO., LTD., have published this week a very attractive catalogue in connection with their new and secondhand drum business, copies of which can be obtained upon application at their head office, 4, Lloyd's Avenue, London, E.C.3 (telephone, Royal 0125). Not only is this catalogue very well illustrated, but it also contains information which will be of daily service to the trade. Very extensive stocks of new and secondhand drums are available for immediate delivery from the various depots, in fact it is stated that the stock is the largest in the country. They are sole distributors for several leading manufacturers, specialising in steel drums and barrels of various types, and their secondhand department is also another important factor. They have up-to-date plant for reconditioning drums.

From Week to Week

FATAL INDUSTRIAL ACCIDENTS reported during August included five in chemical, etc., factories.

THE INSTITUTE OF METALS, founded 1908, will hold its "coming-of-age" celebrations on March 6, 1929, at a meeting held in London under the presidency of Dr. W. Rosenhein, F.R.S.

MR. H. R. ARMSTRONG, joint managing director, and Mr. James Sharp, executive director, of the Bradford Dyers' Association, Ltd. leave for New York in the *Berengaria* to-day (Saturday).

MR. H. STANLEY RICHARDS, B.Sc., of Fishguard, has been appointed lecturer in industrial chemistry at the Scots College, Safad, Palestine, and will commence his duties next month.

APPROVAL OF THE CONSTRUCTION of a pumping station and reservoir by Synthetic Ammonia and Nitrates, Ltd., was given by the Billingham Urban District Council on Wednesday evening.

DR. GEORGE BARGER, professor of medical chemistry in the University of Edinburgh, has been elected a corresponding member of the Göttingen Gesellschaft der Wissenschaften (Göttingen Scientific Society).

THE RAMSAY CHEMICAL DINNER will be held in the Grosvenor Restaurant, Glasgow, on Tuesday, December 11. The convener of the dinner committee is Mr. R. G. W. Eadie, F.I.C., of Provan Chemical Works, Millerston, Glasgow.

DISEASES OF OCCUPATIONS noted in Great Britain and North Ireland during August under the Factory and Workshop Act included 1 case of arsenical poisoning; 8 of aniline poisoning; and 2 cases of chrome ulceration (1 in the dyeing and finishing trade, and 1 in other industries).

PROSPECTING and some development work was done in 1927 on cinnabar properties in the Bridge River area of the Lillooet mining division and in the Kamloops mining division of British Columbia. This mercury ore also occurs in the same province in the Alberni mining division of Vancouver Island.

LORD MELCHETT has purchased from Daveen Brothers one of the finest female portraits by Rembrandt. Before the portrait is sent to his home Lord Melchett has consented to lend it for a fortnight to an exhibition of the work of old masters at Bradford. The purchase price of the portrait is stated to have been £40,000.

COMPLAINTS HAVE BEEN MADE by certain residents in Streatham Vale of the emission of fumes from a chemical works in the district, and representations made to the Ministry of Health have had some effect in bringing about a reduction of the emission. It is understood, however, that further representations will be made to the Ministry in the near future.

THE OIL AND COLOUR CHEMISTS' ASSOCIATION announces that Professor A. P. Laurie, M.A., D.Sc., will open its programme with a lecture, delivered on Thursday, October 4, at the Institute of Chemistry, 30, Russell Square, London, at 7.30 p.m. The lecture will deal with "The Preliminary Report of the Sub-Committee of the Royal Academy Committee of Arts on Modern Pigments and Media."

A PACKAGE containing 44 ounces of cocaine was lost or stolen in transit between the factory of May and Baker, Ltd., Battersea, and the King George V Dock, London, on Thursday, September 20. The package was destined for New Zealand, and bore only the mark K.P. and Coy., Dunedin. The package was traced to Canning Town, and recovered intact. Three men were arrested in connection with the matter.

AN INQUEST was held at Greenwich on Tuesday, September 18, on Guy William Carr Gardener, aged 31, an assistant chemist in the Department of Explosives Research, Research Department, Woolwich Arsenal, who was fatally injured in a motor collision on the previous Sunday. It was stated that Mr. Gardener was driving his car, when the wheels hit the tramlines and caused a collision with a tram. He died in hospital later, following the amputation of the arm. A verdict of "Accidental death" was recorded.

REPORTS ARE CURRENT in South Wales that a group of industrialists, headed by Baron Hirsch, is negotiating for collieries in the Kenfig Hill and Caerau districts of Mid-Glamorgan with the intention of utilising the output for by-product purposes. According to a Welsh correspondent a number of inquiries for sites suitable for by-product works have been made in the district, and local business men are inclined to credit a report that the site of Baldwins Steelworks, Port Talbot (which is being dismantled), will be used for the erection of a by-products works.

A SERIES OF LECTURES on "Chemical Plant" will be given at the Sir John Cass Technical Institute, London, on Tuesday evenings commencing on October 16, when the first, on "Evaporation and Heat Transmission," will be given by Mr. J. A. Reavell. Other lectures will be as follows:—"Acid Elevators and Pumps, and Fans for Acid Gases," by a representative of the Kestner Evaporator and Engineering Co., Ltd.; "Crushing, Pulverising and Grinding," by Mr. W. Bullock; "Centrifuges and Hydro-Extraction," by Mr. B. L. Broadbent; "Ferro-Silicon Alloy Plant," by Mr. S. J. Tungay; "Fused Silica and its Applications in Chemical Industry," by Mr. R. W. Clark; "Aluminium Plant," by Mr. E. T. Painton. Further details will be found in our advertisement columns, p. xxxv.

DUNCAN, STEWART AND CO., have obtained from the Portuguese Government the concession for the erection of a sugar factory in Umbluzi, Portuguese East Africa.

DR. WILLIAM THOMAS, A.I.C., principal of the Miners' Technical Institute, Wrexham, is leaving North Wales for an appointment in London under the Board of Education.

SIR HARRY AND LADY MCGOWAN and Miss McGowan left England on Saturday, September 22, for Canada and the United States, whence they are expected to return at the end of October.

THE RIO TINTO CO. has come to an agreement with the United States Davison Chemical Co. under which it has the right to subscribe for shares in the Davison subsidiary, the Silica Gel Corporation.

A SPANISH RESIN CONSORTIUM is to be instituted for 20 years. The consortium will comprise municipalities possessing resinous forests, the State in its full capacity as owner of resinous forests, and a syndicate of resin makers.

THE OPENING MEETING of the Bristol Section of the Society of Chemical Industry will be held on October 4, at the University Chemistry Department, when Dr. S. Williamson, F.I.C., will read a paper on "Chilean Nitrate of Soda."

THE DIRECTORS OF WASTE FOOD PRODUCTS announce that in addition to the British rights held by the company for treating waste food they have now secured the world rights from the patentee, and these have been duly protected.

THE PERCENTAGE UNEMPLOYMENT of insured persons in Great Britain and Northern Ireland at August 20 in chemicals manufacture was 6·4; in explosives manufacture, 5·4; in paint, varnish, japan, red and white lead manufacture, 4·5; and in oil, grease, glue, soap, ink, match, etc., manufacture, 6·5.

RECENT WILLS INCLUDE:—Mr. Wilkinson Peel, master dyer, Birkenshaw, £11,927 (net personalty, £9,966).—Mr. Walter Johnson Cooper, chairman of the South Wales Portland Cement and Lime Co., Ltd., a director of British Portland Cement Manufacturers Ltd., and of Whites South African Cement Co., Ltd., £92,834 (net personalty, £82,503).

UNEMPLOYED INSURED PERSONS at August 20, 1928, in Great Britain and Northern Ireland in chemicals manufacture numbered 5,909 (males 5,152, females 757); in explosives manufacture, 1,000 (males 647, females 353); in paint, varnish, japan, red and white lead manufacture, 814 (males 688, females 126); in oil, grease, glue, soap, ink, match, etc., manufacture, 5,002 (males 4,259, females 743).

WORLD PRODUCTION of synthetic resin in 1926 is estimated to have been 13,000 tons, according to the U.S. Department of Commerce, as compared with 900 tons in 1921. Of this 40 per cent. was produced by the United States, 24 per cent. by Germany, 16 per cent. by Great Britain, 8 per cent. by France and 12 per cent. by other countries. Figures for 1927 are not completely available, but 13,452,230 lb. of synthetic resin was produced by the United States.

THE CONSTRUCTION of an explosives plant near Winnipeg at a cost of approximately £200,000 is planned by Canadian Industries, Ltd. The Manitoba plant, which will be the first to be operated in the middle western field by the firm, will serve the mining fields of Western Canada. The company controls six of the largest chemical industries in Canada, and is affiliated with Imperial Chemical Industries, Ltd., and the Dupont Co. The extension of the company's holdings in Manitoba will be the first step in a general programme to serve Western Canada.

ARTIFICIAL SILK NEWS.—According to the *Financial News*, a new concern, the British Cuprammonium Silk Spinners, Ltd., are to erect a factory at Kendal, Westmorland, to work the cuprammonium process, which has been improved in many ways by Count Callimachi. The company will work according to these improved formulæ and has secured the services of Count Callimachi as chief technical adviser.—A German firm of artificial silk manufacturers will build a factory at Doncaster, at which about 5,000 people will be employed. A number of men will be taken to Germany for training as overseers.—The issue of 60,000 8 per cent. first cumulative preference shares of £1, at 25s. per share, to shareholders of Harbens Viscose Silk Manufactures, was applied for nearly four times over.—The building and equipment of the additional acetate factory for the British Acetate Silk Corporation are proceeding according to prospectus time. Lewis Street Mills, Halifax, have been acquired enabling 40,000 lbs. of yarn weekly to be dyed and finished.

Obituary

BIRGER CARLSON in Stockholm, on August 27, aged 54. Son of the founder of the Stockholms Superfosfatfabrik, he studied at the Technical High School at Berlin-Charlottenburg. In 1898-1900 he erected carbide factories all over Europe for the Deutsche Gold- und Silber-Scherdeanstalt, of Frankfort. He also erected a carbide factory for his father's company, of which he ultimately became chief. He took out many patents, and published about 120 papers.

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The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Complete Specifications

295,974. Liquid and Gaseous Hydrocarbons of Low Boiling Point from Mineral and Other Oils, Tars, etc., Production of. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, April 21, 1927.

When hydrocarbons are cracked at 500°—600° C., considerable deposition of carbon takes place. It is now found

Fig. 1

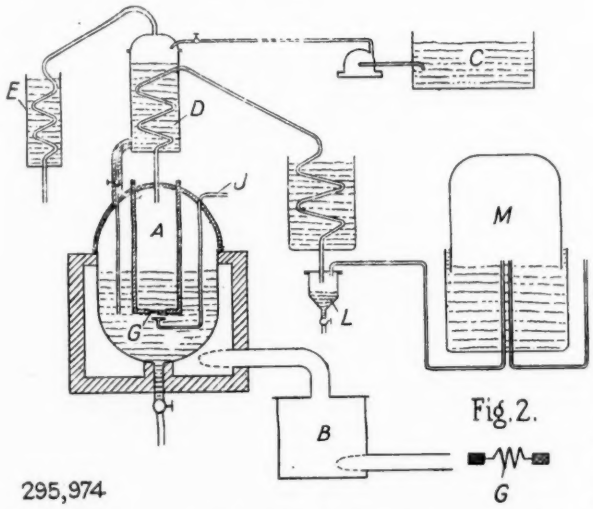

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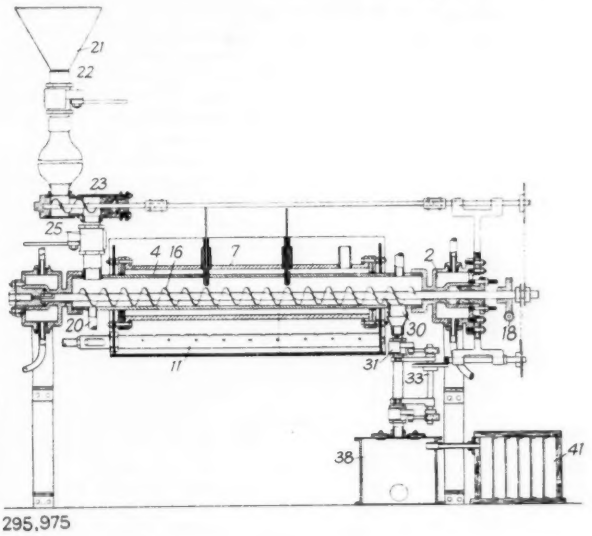
Fig. 2.

that this may be avoided if the hydrocarbon is cracked by means of a heating device in the liquid heated to red heat or white heat and exposed to a blast of air, hydrogen, steam, or ammonia, the blast being heated to 500° C. The heating device may be of small dimensions, *e.g.*, a rod or wire of metal, silicon carbide, graphite, or charcoal, heated electrically. In the case of tar or mineral oil containing oxygen or sulphur, the heating device must be inert to these, and if heated to very high temperatures must not be of metal which forms carbides. When cracking is effected at 500° C., the resulting oils boil mainly between 80—300° C., and the gases contain mainly olefines. When cracking is effected at 700°—1000° C., less higher boiling hydrocarbons are obtained, and the gas is mainly methane.

Brown coal tar freed from phenols is pumped from a vessel C to a preheater D, where it is heated to 250° C. by means of gases from the boiler A. The gaseous constituents are condensed in a cooler E. The tar passes into a boiler A heated by furnace B to 350° C., and is decomposed by a ribbon of nickel-chromium G, heated electrically to 750° C. Steam is blown through a pipe J against the heater G, and oils boiling between 80°—200° C. are condensed in the cooler K and drawn off to a vessel L. The gases pass to a container M. Another example is given of the treatment of crude paraffin.

295,975. Red Lead, Method and Apparatus for the Production of. E. Hayward, Wendover Lodge, Welwyn, Herts. Application date, February 22, 1927.

Lead or lead oxide is converted into red lead by heating in air or oxygen at a pressure of 20—30 atmospheres. The raw material is fed from a hopper 21 through a valve 22 to a small conveyor 23, and thence through valve 25 to a reaction chamber 4 heated by molten lead in a surrounding chamber 7, which is kept hot by burners 11. Material is conveyed through the chamber 4 by screw 16, and air or oxygen is admitted by pipe 20. The red lead which is produced is withdrawn through pipe 30 controlled by a pair of automatic valves 31, actuated from a shaft 33 in such a manner that only one valve is open at a time, so that the pressure is maintained in the chamber 4. The red lead passes into a chamber 38 together with gas which passes through valve 31, and the gas then passes to the

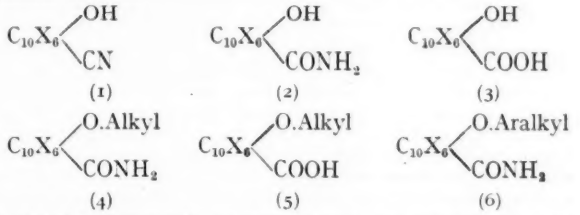


295,975

air through a silencer 41. The temperature of the reaction is preferably 400°—500° C. The shaft bearings of the shaft 16 are cooled by water circulating through chambers 2. The conveyors and discharge valves are all actuated from the same source of power connected to a worm 18.

296,010. Cyan-Naphthalene Sulphonic Acids, Process for Converting. K. Carpmael and K. S. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, Feb. 21, 1927.

Cyan-naphthalene sulphonic acids containing at least one sulphonic group in ortho or para position to the cyanic group are treated with alkaline substances at temperatures of 80°—250° C., so that the sulphonic group is exchanged for a hydroxy, alkoxy, or aralkoxy radicle. The products correspond to the general formulæ :—



in which X represents hydrogen atoms, one or more of which may be replaced by a monovalent substituent. If mild acting alkaline substances are used, *e.g.*, basic alkaline salts such as sodium formate, acetate, borate, or phosphate, the cyanic group of the cyan-naphthalene sulphonic acid is not attacked and hydroxy cyan-naphthalene compounds are formed. If stronger alkaline agents are used, *e.g.*, caustic alkalies, the cyanic group is saponified to the carboxy amide or to the carboxy group, whereas the sulphonic group is exchanged by hydroxy or by an alkoxy group. The latter reaction is without any analogy in the naphthalene series. The ortho and para cyan-naphthalene sulphonic acids and their nuclear substitution products are obtained by diazotising the corresponding amino-naphthalene sulphonic acids and treating the diazo compounds with cuprous cyanide according to Sandmeyer's reac-

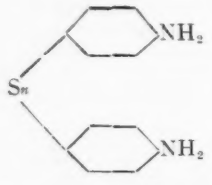
tion. The products are intermediates for the production of dyestuffs and pharmaceutical products, and a number of examples are given.

296,034. Liquid Hydrocarbons of Low Boiling Point, Manufacture of. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, February 22, 1927.

Coal, tar, mineral oils, and other bituminous substances are subjected to pyrogenic decomposition by atomising and passing them together with steam through pipes heated to redness. The resulting gas containing olefines is heated in the absence of iron, cobalt, nickel, or their carbonyls, which cause separation of carbon, to obtain liquid hydrocarbons of low boiling point. An increased pressure may be employed in the latter reaction, and catalysts may be employed such as metallic oxides, silica, graphite, active charcoal, mica, pumice, porcelain, barium, carbonate, molybdenum, tantalum, tungsten, copper, silver, gold, chromium, boron, or their compounds. At a temperature of 300°—400° C., the product contains a large proportion of liquid olefines, but at a temperature of 550° C. the product consists mainly of benzol hydrocarbons and naphthalenes. It is necessary to remove sulphur compounds from the gases before the above treatment, by absorption with caustic alkalies or otherwise. Examples are given of the treatment of coal tars, pulverised coal, etc.

296,047. Azo Dyes. British Dyestuffs Corporation, Ltd., Hexagon House, Blackley, Manchester, R. Brightman and P. Chorley, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, April 22, 1927.

Azo dyestuffs are obtained by tetrazotizing a diamine of the formula



where n is 1, 2, or 3 and coupling with two molecular proportions of a 2:8-amino-naphthol sulphonic acid or an N-substituted derivative, or with one molecular proportion of the acid or derivative, and one molecular proportion of a phenol or amine of the benzene or naphthalene series or a derivative, including the carboxylic and sulphonic acids. In an example, 4 : 4^1-diamino-diphenyl sulphide is tetrazotised and coupled with salycylic acid and then with 2-phenylamino-8-naphthol-6-sulphonic acid. Other examples are also given. The products give yellow red or brown shades on viscose silk.

296,106. N-Dihydro-1 : 2 : 1^1 : 2^1-Anthraquinone-azine, Manufacture and Production of. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges. Frankfort-on-Main, Germany. Application date, February 22, 1927.

A blue dyestuff N-dihydro-1 : 2 : 1^1 : 2^1-anthraquinone-azine is obtained by the action of fused caustic alkali on 2-amino-anthraquinone, and it has now been found that a better yield can be obtained by the addition of salts of lower fatty acids containing not more than 3 atoms of carbon, such as formic, acetic, or propionic acid, in conjunction with higher mono-carboxylic fatty acids containing 4 or more atoms of carbon, such as salts of butyric acid, or with water soluble compounds of high molecular weight having wetting properties. The higher mono-carboxylic acids can be replaced by alcoholates or phenolates. Examples are given.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention: 270,287 (Urbain Corporation) relating to separation of gaseous mixtures, see Vol. XVII, p. 39; 271,898 (Soc. of Chemical Industry in Basle) relating to products for making dyestuff preparations, see Vol. XVII, p. 134; 275,230 (I.G. Farbenindustrie Akt.-Ges.) relating to yellow dyeings on cellulose esters or ethers, see Vol. XVII, p. 331; 283,117 (M. Buchner) relating to production of alumina, see Vol. XVIII, p. 225; 284,614 (J. R. Geigy Akt.-Ges.) relating to acid dyestuffs of the pheno-naphtho-safranine series, see Vol. XVIII, p. 326.

International Specifications not yet Accepted

294,099 and 294,100. Hydrocarbon Oils. C. Epner, 3, Kuno-Fischerstrasse, Heidelberg, Germany. International Convention date, July 16, 1927.

294,099. Methane, gases obtained by cracking hydrocarbons, or ethane or ethylene from coke oven gases may be treated in a high frequency electric field to obtain lubricating oils.

294,100. Liquid fuel is obtained by treating hydrocarbon gases with dark or silent electric discharges of high tension and periodicity, and at a high temperature. The products may be hydrogenated.

294,113. Hydrogen. R. Battig, 36, Mont Cenis Strasse, Holthausen, near Sodingen, Germany. International Convention date, July 16, 1927. Addition to 271,491.

The methane fraction obtained from coke oven gas is treated with steam or oxygen to obtain carbon dioxide and hydrogen, and the carbon dioxide is removed by water under pressure. The mixture is cooled to $-70°$ C. and then further cooled by liquid nitrogen and fractionated. The hydrogen fraction is treated with liquid nitrogen to remove traces of methane, oxygen and carbon monoxide, and the resulting gas is employed for the synthesis of ammonia.

294,117. Fertilizers. Elektricitätswerk Lonza, 75, Aeschenvorstadt, Basle, Switzerland. International Convention date, July 14, 1927.

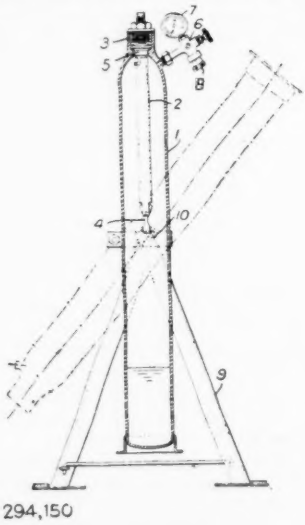
Crude phosphate is treated with nitric acid of such concentration that the product contains less than the normal water of crystallisation. A mixture of calcium nitrate and phosphate is obtained, which does not readily become damp.

294,118. Quinoline Derivatives. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, July 15, 1927.

Compounds for therapeutic purposes are obtained by treating a 2- or 4-oxy- or oxydihydro-quinoline carboxylic acid or a derivative or a quinoline carboxylic acid halogenated in the 2- or 4-position or a derivative, with an amino-alcohol or an ester or alkali compound. If necessary, the product is hydrolysed or treated with an alcoholate. Thus, 2-oxy-4-quinoline-carboxylic acid diethyl-amino-ethanol ester is obtained from sodium 2-oxy-4-quinoline-carboxylate and chlorethyl-diethylamine. Other examples are given.

294,150. Hydrogen. Oxhydrique Française, 25, Rue Béranger, Malakoff, Seine, France. International Convention date, July 18, 1927.

Silicon or ferrosilicon is treated with caustic alkali solution under pressure to obtain hydrogen. Soda or potash is introduced at 3 into a generator 1 pivoted at 10. A tube 2 contains ferrosilicon which is distributed by the motion of a pivoted member 4 when the generator 1 is rocked. When the pressure indicated by a gauge 7 ceases to increase, the apparatus is cooled by water sprinkling and the hydrogen discharged



294,150

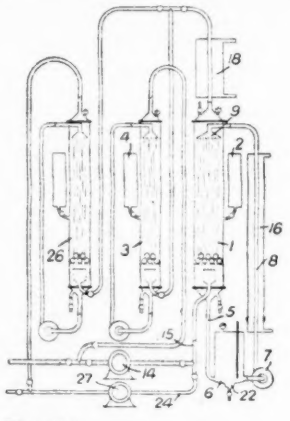
through valve 6. The apparatus is then inverted and the contents discharged through opening 3.

294,214. CARBON. Soc. Anon. des Charbons Actifs E. Urbain, 134, Boulevard Haussmann, Paris. International Convention date, July 20, 1927.

Hard wood or cocoanut shell is carbonised below 600° C. and treated at 500°–700° C. with phosphorus vapour. The phosphorus remaining in the material is oxidised and removed by washing. The phosphorus is conveyed over the material by means of superheated steam.

294,226. ACETIC ACID. J. Karpati, 15, Debroi-Ut, Budapest, and M. G. Hübsch, 48, Csengery-Utca, Budapest. International Convention date, July 21, 1927.

Acetic acid is obtained from acetylene by absorption in a mercury salt and oxidation in presence of a catalyst. A



294,226

chamber 1 contains 98 per cent. acetic acid, with mercuric sulphate and 0.1 per cent. of cellulose which has been activated by heating in nitrogen. The liquid passes through pipe 5, vessel 6, pump 7, pipe 8, and sprayer 9 back to the chamber 1, and acetylene is supplied by pump 14 and pipe 15 to chamber 1. The gas passes through a reflux condenser 18 to a washer 3, and thence back to the chamber 1. Oxygen is supplied alternately with the acetylene, through pump 27 and pipe 24 to chamber 1, and thence through washer 26 back to the chamber 1. The washer 26 contains alkaline liquor to absorb carbon dioxide and any entrained acid. Liquor is partly withdrawn from chamber 1 and replaced by water. Acetaldehyde is absorbed in the washer 3, and is partly withdrawn and replaced by water. The reaction is promoted by adding 0.1—0.2 per cent. of sulphuric acid to the acetic acid. Other catalysts may also be used.

294,227. ACETALDEHYDE. J. Karpati, 15, Debroi-Ut, Budapest, and M. G. Hübsch, 48, Csengery-Utca, Budapest. International Convention date, July 21, 1927.

The apparatus is similar to that described in 294,226 above, omitting the washer 26. Sulphuric acid of 25 per cent. strength containing mercuric sulphate may be employed in the reaction chamber.

294,236. BORIC ACID. American Potash and Chemical Corporation, 233, Broadway, New York. (Assignees of W. E. Burke and H. de Ropp, Trona, Cal., U.S.A.) International Convention date, July 22, 1927.

Borax is treated with sulphuric acid, and the boric acid crystallised out. Borax and water are added to the liquor which is cooled to crystallise sodium sulphate. The liquor is mixed with sulphuric acid and borax and the cycle recommences.

294,238. PHENOLS. Schering Kahlbaum Akt.-Ges., 170, Müllerstrasse, Berlin. International Convention date, July 21, 1927.

Alkylphenols are obtained by heating an alkyl ether of a phenol under pressure in presence of silica gel or fullers' earth. In examples, phenol ethylether is converted into ethyl phenol and some diethylphenol, phenol cyclo-hexylether into cyclohexylphenol, and the isopropylether of *m*-cresol into thymol and 3-methyl-4-isopropylphenol.

294,259. PURIFYING SOLUTIONS. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, July 21, 1927.

Zinc chloride solution obtained in the manufacture of vulcanised fibre or parchment paper is purified from organic matter by treating with oxygen at 200° C. and 20 atmospheres pressure.

294,263. SYNTHETIC DRUGS. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, July 21, 1927.

An oxyaldehyde-arsinic acid or an oxyketone-arsinic acid, *e.g.*, 3-oxybenzaldehyde-4-arsinic acid is treated with thio-semi-carbazide before or after reduction to the arseno compound, to obtain thio-semicarbazones of arsenophenol-aldehydes or ketones, *e.g.*, in the above case, 4 : 4^1-arseno-3 : 3^1-dioxybenzaldehyde-thio-semi-carbazone is obtained.

294,264. SILICIC ACID SOLS. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, July 21, 1927.

Silicic acid sols up to 15 per cent. silica are obtained by treating a purified silicic acid gel with ammonia solution of 0.5–1 per cent. strength, and then heating for 1–2 days without allowing evaporation.

294,265. HYDROGEN PEROXIDE. P. Askenasy, 44, Kaiserallee, Karlsruhe, Germany. International Convention date, July 21, 1927.

Hydrogen peroxide is obtained by treating an aqueous suspension of barium peroxide with carbon dioxide under pressure in the presence of small quantities of hydrochloric acid or barium chloride.

294,462. DYE INTERMEDIATES. Compagnie Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord Reunies, Etablissements Kuhlmann, 11, Rue de la Baume, Paris. International Convention date, July 23, 1927.

To obtain halogenated aromatic carbocyclic and heterocyclic bases, the corresponding sulphamido derivatives from aryl sulphonic acids are halogenated and the products hydrolysed. Thus, *o*-toluenesulphon-*o*-toluidide is chlorinated to obtain *o*-toluenesulphon (5-chlor-2-methyl-1-anilide) which is hydrolysed to obtain 5-chlor-1 : 2-toluidine. Aryl-sulphonamides of aromatic carbocyclic and heterocyclic bases are obtained by condensing the corresponding bases with aryl-sulphon-chlorides or by condensing aryl-sulphonamides with aromatic compounds containing a mobile substituent in the nucleus. Several additional examples are given.

294,474. POLYMERISED VINYL COMPOUNDS. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, July 23, 1927.

Rubber substitutes are obtained by polymerizing vinyl esters of inorganic or organic acids or vinyl ethers in presence of substances such as proteids, peptones, peptides, diketopiperazines, and amino acids which impart improved elasticity. The polymerization can be effected by heating, or radiation from a mercury vapour lamp in the presence of an accelerator.

294,486. DYES. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, July 21, 1927. Addition to 262,774. (See THE CHEMICAL AGE, Vol. XVI, p. 189.)

Violanthrone is chlorinated with ferric chloride at 140°–150° C. in trichlorbenzene. The product dyes cotton in blue shades fast to water.

294,550. DYES. I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, July 25, 1927. Addition to 205,502. (See THE CHEMICAL AGE, Vol. IX, p. 693.)

These dyes are obtained by condensing α-benzoyl-naphthalene or a derivative having the 4, 5, and 8-positions of the naphthalene nucleus free, with an aroyl chloride or anhydride, *e.g.*, benzoyl chloride or benzoic anhydride, by means of aluminium chloride or sodium aluminium chloride in the presence of air or oxygen. The condensation can be effected in either one or two stages.

294,572. SULPHURIC DERIVATIVES OF CARBOHYDRATES. W. Traube, 11, Lützowplatz, Berlin. International Convention date, July 26, 1927.

Protective colloids and intermediates in the manufacture

of cellulose acetate and nitrate are obtained by treating dry cellulosic materials with sulphur trioxide diluted with air. Different compounds are obtained according as the sulphur trioxide is, or is not, in excess. The products are neutralised with caustic potash.

LATEST NOTIFICATIONS.

297,029. Process for the manufacture of substituted guanidines. Schering-Kahlbaum Akt.-Ges. September 12, 1927.

297,083. Manufacture of pure *m*- and *p*-cresols. Schering-Kahlbaum Akt.-Ges. September 14, 1927.

297,112. Reeling of artificial threads. I.G. Farbenindustrie Akt.-Ges. September 15, 1927.

297,114. Process for removing sulphuretted hydrogen from gases. Kali-Industrie Akt.-Ges., Thorssell, C. T., and Kristensson, A. September 16, 1927.

297,034. Manufacture of oil lacquers and varnishes. I.G. Farbenindustrie Akt.-Ges. September 12, 1927.

297,118. Manufacture of artificial threads. I.G. Farbenindustrie Akt.-Ges. September 15, 1927.

297,123. Process for the manufacture of sulphur dyestuffs. I.G. Farbenindustrie Akt.-Ges. September 15, 1927.

297,124. Manufacture of piece-dyed woollen fabrics containing effects of silk. I.G. Farbenindstrie Akt.-Ges. September 16, 1927.

297,331. Manufacture of dyestuffs containing metal. Soc. of Chemical Industry in Basle. September 17, 1927.

Specifications Accepted with Date of Application

271,452. Hydrocarbons, Process for the manufacture and production of. I. G. Farbenindustrie Akt.-Ges. May 22, 1926.

271,906. Vat dyestuffs, Manufacture of. I. G. Farbenindustrie Akt.-Ges. May 29, 1926.

272,920. Coating of metals by the cementation process, Metallbank und Metallurgische Ges. Akt.-Ges. June 15, 1926.

281,257. Hydrogenated naphthostyril, Manufacture of. I. G. Farbenindustrie Akt.-Ges. November 25, 1926.

295,403. Inactive menthol, Production of. Rheinische Kampfer Fabrik Ges. February 15, 1927.

285,451. Aromatic oxyaldehydes, Preparation of. J. D. Riedel Akt.-Ges. February 17, 1927.

285,915. Metal bromides, Preparation of. J. H. van der Meulen. February 25, 1927.

289,848. Flotation processes for the treatment of ores, coal, and the like. W. Schafer, and Erz-und Kohle-Flotation Ges. May 4, 1927.

290,971. Phosphorus and ferro silicon, Production of. I. G. Farbenindustrie Akt.-Ges. May 21, 1927.

293,795. Dyestuff preparations, Manufacture of—and their application. Soc. of Chemical Industry in Basle. July 12,1927.

296,683. Working with hydrocarbons at high temperatures, Method of. J. Y. Johnson. (*I. G. Farbenindustrie Akt.-Ges.*) March 3, 1927.

296,685. Aqueous dispersons of organic substances, Method of producing. Anode Rubber Co., Ltd. (in liquidation). (*P. Klein and A. Szegvari.*) March 4, 1927.

296,693, 296,694, 296,752, 296,753. Working with hydrocarbons at high temperatures, Method of. J. Y. Johnson. (*I. G. Farbenindustrie Akt.-Ges.*) March 3, 1927.

296,713 and 296,751. Gases, Process for the production of. J. Y. Johnson. (*I. G. Farbenindustrie Akt.-Ges.*) April 2, 1927. Additions to 214,544.

296,746. Copper cakes, Production of. G. B. Ellis. (*Anaconda Copper Mining Co.*) June 7, 1927.

296,744. Ores or the like containing platinum, Treatment of. S. C. Smith. June 7, 1927.

296,803. Direct dyes for cotton and for regenerated cellulose materials, Manufacture of. British Dyestuffs Corporation, Ltd., and W. A. Silvester. June 7, 1927.

296,813. Placer mining by direct leaching with cyanide of other solvents. B. Stoces. June 9, 1927.

296,814. Precipitation (cementation) of copper. A. Carpmael. (*I. G. Farbenindustrie Akt.-Ges.*) June 9, 1927.

296,817. Condensation products of anthraquinone, Process for the manufacture of. A. Carpmael. (*I. G. Farbenindustrie Akt.-Ges.*) June 10, 1927.

296,832. Calcium nitrate together with alumina and phosphorus, Manufacture and production of. J. Y. Johnson. (*I. G. Farbenindustrie Akt.-Ges.*) June 16, 1927.

296,847. Paraformaldehyde, Manufacture and production of. J. Y. Johnson. (*I. G. Farbenindustrie Akt.-Ges.*) July 1, 1927.

296,899. Wet extraction of copper. F. Dietzsch. September 26, 1927.

296,919. Cracking and fractionation of hydrocarbon mixtures and apparatus therefor. C. Arnold. (*Standard Development Co.*). October 22, 1927.

296,925. Purifying gases and gaseous mixtures. J. H. Bregeat. November 24, 1927.

296,935. Highly sulphonated oils, fats, fatty acids, and waxes, Manufacture of. Erba Akt.-Ges. November 22, 1927. Addition to 294,621.

Applications for Patents

Bohme, Akt.-Ges., H. T. Preparation of aliphatic sulpho acids. 27,110. September 21 (Germany, October 11, 1927).

British Thomson-Houston Co., Ltd., Newbound, R., Ward, A. T., and Warren, H. W. H. Synthetic resins, etc. 26,743. September 18.

Carpmael, A., Johnson, J. Y., and I.G. Farbenindustrie Akt.-Ges. Capsule packing. 27,185. September 21.

Coley, H. E. Condensation of metallic vapours. 26,858. September 19.

Coley, H. E. Reduction of ores, etc. 27,001. September 21.

Crosland, G. A. Water-softening apparatus, etc. 27,234. September 22.

Fraser, J. P. Destructive distillation, etc., of carbonaceous material. 27,183. September 21.

Geigy Akt.-Ges., J. R. Manufacture of acid dyestuffs. 27,180. September 21. (Germany, September 21, 1927.)

Hackford, J. E. Low-temperature carbonisation of fuels. 26,857. September 19.

Hefti, F. Production of barbituric acid compound. 26,797. September 19. (Switzerland, March 9.)

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of water gas, etc. 26,595. September 17.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of vitamin D. 26,596. September 17.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of products resembling linoxyn. 26,597. September 17.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of carbon. 26,598. September 17.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of hydrocarbons. 26,599. September 17.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of phosphoric acid and hydrogen. 26,600. September 17.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of higher alcohols, acetone, etc. 26,869. September 19.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of phosphoric acid and hydrogen. 26,870. September 19.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of granular fertilisers, etc. 27,108. September 21.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of metallic powders for cores of magnets. 27,109. September 21.

I.G. Farbenindustrie Akt.-Ges. Manufacture of vat dyestuff mixtures. 27,250. September 22.

I.G. Farbenindustrie Akt.-Ges. Diminishing swelling in cellulose, etc. 26,751. September 18. (Germany, September 23, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of films, etc., from cellulose ethers. 26,752. September 18. (Germany, September 24, 1927.)

I.G. Farbenindustrie Akt.-Ges. Shutter for photographic objectives. 26,753. September 18. (Germany, December 9, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of valuable liquid products from varieties of coal, etc. 26,868. September 19. (December 9, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of synthetic tanning-agents. 26,871. September 19. (Germany, September 30, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of azo-dyestuffs. 26,872. September 19. (Germany, September 19, 1927.)

I.G. Farbenindustrie Akt.-Ges. Film-shifting device for cameras. 27,178. September 21. (United States, September 21, 1927.)

I.G. Farbenindustrie Akt.-Ges. Double-exposure preventative for cameras. 27,179. September 21. (United States, September 21, 1927.)

Imperial Chemical Industries, Ltd., Lodge F., and Tatum, W. W. Manufacture of anthraquinone derivatives. 26,763. September 18.

Imperial Chemical Industries, Ltd., Lodge F., and Tatum, W. W. Production of fertilisers. 27,062. September 21.

Neumann, E. Manufacture of butyl alcohol. 26,771. September 18.

Pitt, W. J. Electrodeposition of metals. 27,203. September 22.

Soc. of Chemical Industry in Basle. Manufacture of dyestuffs containing metal. 26,630. September 17. (Switzerland, September 17, 1927.)

Soc. of Chemical Industry in Basle. Manufacture of dyestuffs. 27,255. September 22. (Switzerland, September 23, 1927.)

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC. 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £30 per ton; powder, £32 per ton; extra fine powder, £34 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength, and locality.

ACID NITRIC, 80° TW.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.

BLEACHING POWDER.—Spot, £9 10s. per ton d/d; Contract, £8 10s. per ton d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £19 per ton; powder, £21 per ton. (Packed in 2-cwt. bags carriage paid any station in Great Britain.)

CALCIUM CHLORIDE (SOLID).—£5 to £5 5s. per ton d/d carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 3d. to 1s. 8d. per gall., pyridinised industrial, 1s. 5d. to 1s. 10d. per gall.; mineralised 2s. 4d. to 2s. 8d. per gall.; 64 O.P., 1d. extra in all cases.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3¼d. per lb., ex wharf, London, in cwt. kegs,

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton, ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.b. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—6¼d. to 6¾d. per lb. Crude 60's, 2s. per gall.

ACID CRESYLIC 99/100.—2s. 6d. to 3s. per gall. 97/99.—2s. 5d. to 2s. 6d. per gall. Pale, 95%, 2s. 2d. to 2s. 3d. per gall. Dark, 1s. 10d. to 2s.

ANTHRACENE.—A quality, 2½d. per unit. 40%, £5 per ton.

ANTHRACENE OIL, STRAINED.—8d. to 8½d. per gall. Unstrained, 7½d. to 8d. per gall.

BENZOLE.—Prices at works: Crude, 10½d. to 11d. per gall.; Standard Motor, 1s. 4½d. to 1s. 5d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall.; Pure, 1s. 10d. to 1s. 11d. per gall.

TOLUOLE.—90%, 1s. 5d. to 1s. 11d. per gall. Firm. Pure, 1s. 10d. to 2s. 1d. per gall.

XYLOL.—1s. 3d. to 1s. 11d. per gall. Pure, 1s. 6d. to 1s. 7d. per gall.

CREOSOTE.—Cresylic, 20/24%, 9d. per gall.; middle oil, 6¾d. to 7¾d. per gall. Heavy, 7¾d. to 8¾d. per gall. Standard specification, 5¾d. to 6¼d. per gall. ex works. Salty, 7½d. per gall.

NAPHTHA.—Crude, 8½d. to 9d. per gall. Solvent 90/160, 1s. 1½d. to 1s. 2½d. per gall. Solvent 95/160, 1s. 2d. to 1s. 7d. per gall. Solvent 90/190, 11d. to 1s. 4d. per gall.

NAPHTHALENE CRUDE.—Drained Creosote Salts, £5 per ton. Whizzed, £8 per ton. Hot pressed, £8 10s. to £9 per ton.

NAPHTHALENE.—Crystals, £13 to £14 10s. per ton. Quiet. Flaked, £14 to £15 per ton, according to districts.

PITCH.—Medium soft, 43s. 9d. to 46s. 3d. per ton, f.o.b., according to district. Nominal.

PYRIDINE.—90/140, 5s. to 6s. per gall. 90/180, 2s. 6d. to 4s. per gall. Heavy, 2s. to 2s. 6d. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. per lb. 100 %.

ACID BENZOIC.—1s. 8¼d. per lb.

ACID GAMMA.—4s. 6d. per lb.

ACID H.—3s. per lb.

ACID NAPHTHIONIC.—1s. 6d. per lb.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb.

ACID SULPHANILIC.—8½d. per lb.

ANILINE OIL.—8d. per lb. naked at works.

ANILINE SALTS.—8d. per lb. naked at works.

BENZALDEHYDE.—2s. 3d. per lb.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

BENZOIC ACID.—1s. 8¼d. per lb.

o-CRESOL 29/31° C.—5¼d. per lb.

m-CRESOL 98/100%.—2s. 3d. to 2s. 6d. per lb.

p-CRESOL 32/34° C.—2s. 3d. to 2s. 6d. per lb.

DICHLORANILINE.—2s. per lb.

DIMETHYLANILINE.—1s. 11d. per lb.

DINITHROBENZENE.—8½d. per lb. naked at works. £75 per ton.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLAMINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d.

B-NAPHTHOL.—10d. per lb. d/d.

a-NAPHTHYLAMINE.—1s. 3d. per lb.

B-NAPHTHYLAMINE.—3s. per lb.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. per lb. d/d.

p-NITRANILINE.—1s. 8d. per lb.

NITROBENZENE.—6d. per lb. naked at works.

NITRONAPHTHALENE.—1s. 3d. per lb.

R. SALT.—2s. 2d. per lb.

SODIUM NAPHTHIONATE.—1s. 8½d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb.

p-TOLUIDINE.—1s. 10d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 6d. per lb. 100%.

N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £10 5s. per ton. Good demand. Grey, £14 10s. to £15 per ton. Liquor, 9d. per gall.

CHARCOAL.—£6 to £9 per ton, according to grade and locality. Foreign competition severe.

IRON LIQUOR.—1s. 3d. per gall, 32° Tw. 1s. per gall. 24° Tw.

RED LIQUOR.—9d. to 10d. per gall.

WOOD CREOSOTE.—1s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 11d. to 4s. 3d. per gall. Solvent, 4s. 3d. per gall.

WOOD TAR.—£4 to £5 per ton.

BROWN SUGAR OF LEAD.—£40 15s. per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 5½d. per lb., according to quality; Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 9d. per lb.

BARYTES.—£2 16s. 10d. to £3 10s. per ton, according to quality.

CADMIUM SULPHIDE.—3s. 9d. to 4s. 6d. per lb.

CARBON BISULPHIDE.—£25 to £27 10s. per ton, according to quantity.

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£45 to £55 per ton, according to quantity. drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5d. to 6½d. per lb.

LAMP BLACK.—£35 per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPHONE, 30%.—£22 10s. per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton, f.o.r. London.

SULPHUR.—£9 to £11 per ton, according to quality.

SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£55 to £60 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb., carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—6s. 7d. to 7s. per lb.

ZINC SULPHUR.—11d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£39 per ton ex wharf London in glass containers.

ACID, ACETYL SALICYLIC.—2s. 4½d. to 2s. 5d. per lb.

ACID, BENZOIC, B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 3d. to 1s. 4d. per oz., according to quantity.

ACID, BORIC B.P.—Crystal, 36s. to 39s. per cwt.; powder, 40s. to 43s. per cwt.; extra fine powder, 42s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—2s. 9d. to 3s. per lb.
ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.
ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d. 10½d. per lb.
ACID, SALICYLIC, B.P. PULV.—1s. 3d. to 1s. 5d. per lb. Technical.—10½d. to 11½d. per lb.
ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
ACID, TARTARIC.—1s. 4½d. per lb., less 5%.
ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.
AMIDOL.—7s. 6d. to 9s. per lb., d/d.
AMIDOPYRIN.—7s. 9d. to 8s. per lb.
AMMONIUM BENZOATE.—3s. 3d. to 3s. 6d. per lb., according to quantity. 18s. per lb. ex Gum.
AMMONIUM CARBONATE B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.
ATROPINE SULPHATE.—9s. per oz.
BARBITONE.—5s. 9d. to 6s. per lb.
BENZONAPHTHOL.—3s. to 3s. 3d. per lb. spot.
BISMUTH CARBONATE.—9s. 9d. per lb.
BISMUTH CITRATE.—9s. 3d. per lb.
BISMUTH SALICYLATE.—8s. 9d. per lb.
BISMUTH SUBNITRATE.—8s. 3d. per lb.
BISMUTH NITRATE.—Cryst. 5s. 9d. per lb.
BISMUTH OXIDE.—12s. 3d. per lb.
BISMUTH SUBCHLORIDE.—10s. 9d. per lb.
BISMUTH SUBGALLATE.—7s. 9d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W. Qts., 11d. per lb.
BORAX B.P.—Crystal, 24s. to 27s. per cwt.; powder, 25s. to 28s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.
BROMIDES.—Ammonium, 1s. 11d. to 2s. 3d. per lb.; potassium, 1s. 8d. to 1s. 11¾d. per lb.; sodium, 1s. 10½d. to 2s. 2d. per lb.; granulated, ½d. per lb. less; all spot. Large quantities at lower rates.
CALCIUM LACTATE.—B.P., 1s. 2d. to 1s. 3d. per lb.
CAMPHOR.—Refined flowers, 2s. 11d. to 3s. per lb., according to quantity; also special contract prices.
CHLORAL HYDRATE.—3s. 2d. to 3s. 4d. per lb.
CHLOROFORM.—2s. 5½d. to 2s. 7½d. per lb., according to quantity.
CREOSOTE CARBONATE.—6s. per lb.
ETHERS.—S.G. ·730—11d. to 1s. 0d. per lb., according to quantity; other gravities at proportionate prices.
FORMALDEHYDE, 40%.—37s. per cwt., in barrels ex wharf.
GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.
HEXAMINE.—1s. 11d. to 2s. 2d. per lb.
HOMATROPINE HYDROBROMIDE.—30s. per oz.
HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.
HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.
HYPOPHOSPHITES.—Calcium, 3s. 3d. per lb., for 28 lb. lots; potassium, 3s. 7d. per lb.; sodium, 3s. 6d. per lb.
IRON AMMONIUM CITRATE.—B.P., 2s. 11d. to 3s. 2d. per lb. Green, 3s. 4d. to 3s. 7d. per lb.; U.S.P., 3s. to 3s. 3d. per lb.
IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.
IRON QUININE CITRATE.—B.P., 8½d. to 9½d. per oz.
MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.
MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.
MENTHOL.—A.B.R. recrystallised B.P., 21s. per lb. net; Synthetic, 9s. to 10s. per lb.; Synthetic detached crystals, 12s. 6d. per lb., according to quantity; Liquid (95%), 9s. 6d. per lb.
MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 7s. 10d. to 7s. 11d. per lb., levig., 7s. 4d. to 7s. 5d. per lb.; Corrosive Sublimate, Lump, 6s. 1d. to 6s. 2d. per lb., Powder, 5s. 6d. to 5s. 7d. per lb.; White Precipitate, Lump, 6s. 3d. to 6s. 4d. per lb., Powder, 6s. 4d. to 6s. 5d. per lb., Extra Fine, 6s. 5d. to 6s. 6d. per lb.; Calomel, 6s. 8d. to 6s. 9d. per lb.; Yellow Oxide, 7s. 2d. to 7s. 3d. per lb.; Persulph., B.P.C., 6s. 5d. to 6s. 6d. per lb.; Sulph. nig., 6s. 2d. to 6s. 3d. per lb. Special prices for larger quantities.
METHYL SALICYLATE.—1s. 3d. to 1s. 6d. per lb.
METHYL SULPHONAL.—8s. 9d. to 9s. per lb.
METOL.—9s. to 11s. 6d. per lb. British make.
PARAFORMALDEHYDE.—1s. 9d. per lb. for 100% powder.
PARALDEHYDE.—1s. 4d. per lb.
PHENACETIN.—2s. 5d. to 2s. 8d. per lb.
PHENAZONE.—3s. 9d. to 4s. per lb.
PHENOLPHTHALEIN.—6s. to 6s. 3d. per lb.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—95s. per cwt., less 2½ per cent.
POTASSIUM CITRATE.—B.P.C., 2s. 9d. to 3s. per lb.
POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.
POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.
POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included, f.o.r. London.
POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.
QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins.
RESORCIN.—2s. 10d. to 3s. per lb., spot.
SACCHARIN.—47s. per lb.; in quantity lower.
SALOL.—2s. 3d. to 2s. 6d. per lb.
SODIUM BENZOATE, B.P.—1s. 8d. to 1s. 11d. per lb.
SODIUM CITRATE, B.P.C., 1911—2s. 6d. to 2s. 9d. per lb., B.P.C. 1923—2s. 10d. to 3s. per lb. U.S.P., 2s. 9d. to 3s. per lb., according to quantity.
SODIUM FERROCYANIDE.—4d. per lb., carriage paid.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—95s. to 100s. per cwt. Crystals, 4s. per cwt. extra.
SODIUM SALICYLATE.—Powder, 1s. 6d. to 1s. 9d. per lb. Crystal, 1s. 7d. to 1s. 10d. per lb.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.
SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £28 10s. per ton, according to quantity. Delivered U.K.
SULPHONAL.—6s. 6d. to 6s. 9d. per lb.
TARTAR EMETIC, B.P.—Crystal or powder, 2s. to 2s. 3d. per lb.
THYMOL.—Puriss., 9s. 6d. to 9s. 9d. per lb., according to quantity. Firmer. Natural, 13s. 6d. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.
AUBEPINE (EX ANETHOL).—10s. per lb.
AMYL ACETATE.—2s. 6d. per lb.
AMYL BUTYRATE.—4s. 9d. per lb.
AMYL SALICYLATE.—2s. 9d. per lb.
ANETHOL (M.P. 21/22° C.).—5s. 3d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL—2s. per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—2s. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.
BENZYL BENZOATE.—2s. 6d. per lb.
CINNAMIC ALDEHYDE NATURAL.—15s. 6d. per lb.
COUMARIN.—9s. 6d. per lb.
CITRONELLOL.—13s. 6d. per lb.
CITRAL.—8s. 3d. per lb.
ETHYL CINNAMATE.—6s. per lb.
ETHYL PHTHALATE.—2s. 6d. per lb.
EUGENOL.—10s. 6d. per lb.
GERANIOL (PALMAROSA).—23s. per lb.
GERANIOL.—6s. 6d. to 11s. per lb.
HELIOTROPINE.—4s. 6d. per lb.
ISO EUGENOL.—14s. 6d. per lb.
LINALOL.—Ex Bois de Rose, 15s. per lb. Ex Shui Oil, 10s. 6d. per lb.
LINALYL ACETATE.—Ex Shui Oil, 14s. 6d. per lb. Ex Bois de Rose, 18s. 6d. per lb.
METHYL ANTHRANILATE.—8s. 6d. per lb.
METHYL BENZOATE.—4s. per lb.
MUSK KETONE.—35s. per lb.
MUSK XYLOL.—7s. per lb.
NEROLIN.—3s. 6d. per lb.
PHENYL ETHYL ACETATE.—11s. per lb.
PHENYL ETHYL ALCOHOL.—10s. 6d. per lb.
RHODINOL.—40s. per lb.
SAFROL.—1s. 4d. per lb.
TERPINEOL.—1s. 6d. per lb.
VANILLIN.—16s. 6d. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. 6d. per lb.
ANISE OIL.—2s. 9d. per lb.
BERGAMOT OIL.—24s. per lb.
BOURBON GERANIUM OIL.—21s. per lb.
CAMPHOR OIL.—9d. per lb.
CANANGA OIL, JAVA.—12s. per lb.
CINNAMON OIL LEAF.—6s. 9d. per oz.
CASSIA OIL, 80/85%.—7s. per lb.
CITRONELLA OIL.—Java, 2s. 2d. per lb., c.i.f. U.K. port. Ceylon, pure, 2s. 2d. per lb.
CLOVE OIL (PURE 90/92%).—7s. 6d. per lb.
EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%.—2s. per lb.
LAVENDER OIL.—Mont Blanc, 48/50%, Esters, 16s. 3d. per lb.
LEMON OIL.—16s. per lb.
LEMONGRASS OIL.—4s. per lb.
ORANGE OIL, SWEET.—22s. per lb.
OTTO OF ROSE OIL.—Anatolian, 35s. per oz. Bulgarian, 75s. per oz.
PALMA ROSA OIL.—13s. 9d. per lb.
PEPPERMINT OIL.—Wayne County, 15s. per lb.; Japanese, 8s. 6d. per lb.
PETITGRAIN.—8s. 9d. per lb. Sandalwood, Mysore, 26s. 6d. per lb., 90/95%, 16s. 6d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, September 26, 1928.

TRADE has continued active, with a fair amount of business booked. The demand for export is also good.

General Chemicals

ACETONE is still in short supply at £74 10s. to £77 10s. per ton, with a very firm position.
ACETIC ACID is unchanged.
ACID FORMIC is a little easier at £45 per ton for the 85%, and in good demand.
ACID LACTIC is unchanged.
ACID OXALIC.—A fair business has been booked. Price unchanged at £31 to £33 per ton. Position firmer.
ACID TARTARIC.—Firmer at 1s. 4¼d. per lb.
AMMONIUM CHLORIDE is unchanged.
SULPHATE OF ALUMINA is still in short supply. Price unchanged at £6 15s. per ton for 17/18%.
CHLORIDE OF BARIUM is practically unobtainable for prompt delivery. For the limited stocks available the price quoted is £11 to £12 per ton, ex store.
COPPER SULPHATE.—The price is advancing.
CREAM OF TARTAR is a little easier at £97 10s. per ton less 2½%, for 99/100%, B.P.
FORMALDEHYDE is unchanged at £39 per ton, ex wharf, London. and in good demand.
LEAD ACETATE is unchanged at £42 10s. per ton for white and £41 per ton for brown.
LEAD NITRATE is unchanged at £36 to £36 10s. per ton.
LIME ACETATE is unchanged.
METHYL ACETONE remains firm at £59 per ton for 45%.
CARBONATE OF POTASH is unchanged at £25 to £27 per ton for 96/98%.
CHLORATE OF POTASH is firm at £28 to £28 15s. per ton.
PERMANGANATE OF POTASH is firm at 5¼d. to 5½d. per lb.
POTASSIUM PRUSSIATE is firm at £63 to £65 10s. per ton.
SODIUM ACETATE.—The supply is still short at £21 10s. to £22 per ton.
SODIUM PRUSSIATE is very firm at 4½d. to 5d. per lb.
SODIUM PHOSPHATE is unchanged.
TARTAR EMETIC is unchanged at 10¾d. per lb.
ZINC SULPHATE.—£11 10s. to £11 15s. per ton.

Coal Tar Products

The market for coal tar products is still far from active, although there are signs of a renewal of activities in the spirit market. Benzol is distinctly firm, and prices are quoted as follows :—

MOTOR BENZOL.—1s. 6d. per gallon on rails, naked, only small quantities being obtainable.
SOLVENT NAPHTHA still remains firm at 1s. 1¼d. per gallon, on rails, at makers' works, and inquiry is improving.
HEAVY NAPHTHA remains firm at 1s. 1d. to 1s. 1½d. per gallon, on rails.
CREOSOTE OIL is weaker, and can be bought at 5¾d. per gallon, f.o.r. in the North, and at 6¼d. per gallon in London, but there is a scarcity of inquiry.
CRESYLIC ACID still remains weak, the 98/100% quality being quoted at 2s. 2d. per gallon f.o.b., and the dark quality, 95/97%, is quoted at 1s. 10d. per gallon, f.o.b. naked, but there is very little inquiry.
NAPHTHALENES are steady, at £5 per ton for the 74/76 quality, and £6 to £6 10s. per ton for the 76/78 quality, with an upward tendency.
PITCH remains unsettled and there is no sign of an improvement in the market; values vary between 40s. and 50s. f.o.b., according to port.

Latest Oil Prices

LONDON, September 26.—LINSEED OIL was steady but inactive. Spt, ex mill, £30; October to December, £28 5s.; January-April, £28 7s. 6d.; May-August, £28 15s.; naked. RAPE OIL steady at 10s. per ton advance. Crude, extracted, £40 10s.; and technical, refined, £42, naked, ex wharf. COTTON OIL was steady. Egyptian, crude, £31 10s.; refined common edible, £37; deodorised, £39, naked, ex mill. TURPENTINE quiet. American, spot, 42s. 6d.; October-December, 43s. 3d.; and January-April, 45s. per cwt.

HULL, September 26.—LINSEED OIL.—Spot to December, £28 17s. 6d.; January-April, £28 12s. 6d.; May-August, £28 15s. per ton, naked. COTTON OIL.—Bombay, crude, £29 10s.; Egyptian, crude, £30 2s. 6d.; edible, refined, £33 10s.; technical, £33 10s.; deodorised, £35 10s. per ton, naked. PALM KERNEL OIL.—Crushed, 5½ per cent., £37 5s. per ton, naked. GROUNDNUT OIL.—Crushed extracted, £37 10s.; deodorised, £41 10s. per ton. SOYA OIL.—Extracted and crushed, £32 10s.; deodorised, £36. RAPE OIL.—Crude extracted, £40 15s.; refined, £42 15s. per ton, net cash terms. TURPENTINE, CASTOR OIL and COD OIL unaltered.

Nitrogen Products

Sulphate of Ammonia.—The market for this product remains firm at £9 7s. 9d. per ton f.o.b. U.K. port in single bags for prompt shipment. It is understood that good sales are being made in the larger markets and that the demand continues satisfactory from the smaller consuming countries. In the home market it is reported that large buying has taken place for prompt shipment to Ireland. Apart from this few merchants are buying for forward, and the prompt demand continues negligible.

Nitrate of Soda.—Since the announcement of the new prices the demand in Europe has continued very active, and the sales already made indicate that there will be large increases in consumption next year. There has also been large buying for the United States and for Egypt. However, on account of the vast increase in production, the stocks in Chile are higher than at this date last year. The new sales organisation has created a feeling of optimism in nitrogen circles, where a year of substantial recovery is anticipated.

A CIRCULAR ISSUED by the Franco-British Oil Trust states that the testing plant of the Aicher low temperature carbonisation process which has been erected at Campbeltown Colliery, Argyllshire, has recently been put in operation and demonstrations have been conducted. Negotiations are proceeding for the provision of the finance for the erection of the first unit at Campbeltown.

South Wales By-Products

ONLY moderate business is being done in South Wales by-products. Pitch continues to have only a small demand, and prices are nominal on the basis of 42s. 6d. to 46s. per ton, f.o.b. Crude tar has a fairly steady, but small, demand, with values unchanged. Refined tars are better, but prices are unchanged, gasworks tar continuing to sell at from 7½d. to 7¾d. per gallon delivered, and coke oven tar at from 7¾d. to 8d. per gallon, delivered. Crude naphthalene is quiet round about 80s. per ton, f.o.r. maker's works, while whizzed is slightly better at about 90s. per ton, f.o.r. maker's works. Patent fuel and coke exports have improved slightly, but values are unchanged. Patent fuel, ex-ship Cardiff, remains at from 20s. to 21s. 6d. per ton; ex-ship Swansea, 19s. 6d. to 20s. 6d. Coke, best foundry, 32s. 6d. to 37s. per ton; furnace, from 19s. to 21s. per ton, and other sorts from 25s. to 32s. 6d. per ton.

Production of Stable Diammonium Phosphate Fertilisers

A SWEDISH engineer, B. J. Colbjörnsen, has developed a method for the production of diammonium phosphate fertilisers in stable form. Concentrated phosphoric acid is treated with gaseous or other ammonia in such quantities that not only the di- but also some of the tri-phosphate is formed. The temperature is kept so high (90-100° C.) that only small quantities of the mono- and tri-phosphate are formed. The salt formed is separated from the mother-liquor, and dried at a temperature so high that the tri-phosphate present is converted to di-phosphate. The ammonia set free is absorbed in a phosphoric acid tower. The patented process is the property of the Stockholm Superfosfattabrik Aktiebolag in Stockholm.

A CONVENTION has been arrived at between the most important Spanish and other producers of pyrites, according to the president of the Société des Pyrites de Huelva. The convention will last for six years. The world-use of pyrites rose from 4·3 million tons in 1926 to 4·9 million tons in 1927, and in the current year a further increase is expected.

FRENCH CHEMICAL and German oil interests have reached an agreement for the formation of a company for the distillation of mineral oil. A factory will be constructed near Marseilles, with a refining capacity of 300,000 tons of petroleum a year. Most of the technical equipment for the factory will be supplied by deliveries under the reparations scheme.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinion.*

Glasgow, September 20, 1928.

DURING the past week business in the heavy chemical market in this district has been rather quieter, due possibly to some extent to the local holiday. Inquiry for export remains fairly satisfactory and prices generally show little or no change. Acetone still remains scarce for prompt delivery and there has been an advance in the nominal price quoted.

Industrial Chemicals

ACETONE, B.G.S.—Nominally £74 10s. to £77 10s. per ton, ex wharf, but practically none available for immediate delivery.

ACID ACETIC 98/100%.—Glacial £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports; 80% pure £37 10s. per ton, ex wharf; 80% technical £37 10s. per ton, ex wharf.

ACID BORIC.—Crystals, granulated or small flakes £30 per ton. Powder £32 per ton packed in bags, carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—Price maintained at 6½d. per lb., delivered or f.o.b. U.K. ports in moderate demand.

ACID CITRIC, B.P. CRYSTALS.—Now quoted 2s. 3½d. per lb., less 5%, ex wharf.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality 4s. per carboy. Dearsenicated quality 5s. 6d. per carboy, ex works, full wagon loads.

ACID NITRIC, 80°.—£24 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—On offer from the Continent at 3½d. per lb., ex wharf. Spot material quoted 3½d. per lb., ex store. In better demand.

ACID SULPHURIC.—£2 15s. per ton, ex works, for 144° quality. £5 15s. per ton for 168° quality. Dearsenicated quality 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Quoted 1s. 4d. per lb., less 5%, ex wharf, prompt shipment from the Continent. Spot material available at 1s. 4½d. per lb. less 5%, ex wharf.

ALUMINA SULPHATE.—On offer at £5 10s. per ton, c.i.f. U.K. ports. Spot material quoted £5 15s. per ton, ex store.

ALUM, LUMP POTASH.—Quoted £8 7s. 6d. per ton, c.i.f. U.K. ports, prompt shipment from the Continent. Crystal meal quoted £8 10s. per ton, ex store.

AMMONIA, ANHYDROUS.—Quoted 9½d. per lb., carriage paid. Containers extra and returnable.

AMMONIA CARBONATE.—Lump £37 per ton. Powdered £39 per ton, packed in 5 cwt. casks delivered or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanizers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE, 98/100%.—Quoted £40 per ton, ex wharf, prompt shipment from China.

ARSENIC, WHITE POWDERED.—Quoted £18 10s. per ton, ex wharf, prompt despatch from mines. Spot material on offer at £19 15s. per ton, ex store.

BLEACHING POWDER.—British manufacturers' contract price to consumers £6 12s. 6d. per ton, delivered, minimum 4-ton lots. Continental on offer at £6 10s. per ton, ex wharf.

BARIUM CARBONATE, 98/100%.—English material on offer at £7 5s. per ton, ex store. Continental quoted £7 per ton, c.i.f. U.K. ports.

BARIUM CHLORIDE.—Scarce for immediate delivery and spot price about £10 10s. per ton, ex wharf. Offered for prompt shipment from the Continent at £7 15s. per ton, c.i.f. U.K. ports.

CALCIUM CHLORIDE.—British manufacturers' price £4 5s. to £4 15s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works, or £4 12s. 6d. per ton, f.o.b. U.K. ports for export.

COPPER SULPHATE.—Continental material rather higher at about £24 5s. per ton, c.i.f. U.K. ports. Some spot parcels on offer at about £23 per ton, ex store.

FORMALDEHYDE, 40%.—Quoted £35 10s. per ton, c.i.f. U.K. ports. Spot material on offer at £38 per ton, ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental quoted £2 15s. per ton, c.i.f. U.K. ports.

LEAD, RED.—Spot material available at about £30 10s. per ton, ex store. Offered at £29 per ton, c.i.f. U.K. ports.

LEAD, WHITE.—£35 15s. per ton, c.i.f. U.K. ports.

LEAD ACETATE.—White crystals quoted £41 15s. per ton, ex store. Brown on offer at about £40 per ton, ex store.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store. In moderate demand.

METHYLATED SPIRIT.—Industrial quality, 64 O.P., quoted 1s. 4d. per gallon, less 2%, delivered.

POTASSIUM BICHROMATE.—4½d. per lb. delivered minimum 4-ton lots. Under 4-ton lots, ⅛d. per lb. extra.

POTASSIUM CARBONATE, 96/98%.—Offered from the Continent at £25 per ton, c.i.f. U.K. ports. Spot material available at £26 per ton, ex store.

POTASSIUM CHLORATE, 99¾/100%, POWDER.—Quoted £23 per ton, c.i.f. U.K. ports. Crystals, 20s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 5¼d. per lb. ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Offered from the Continent at 6½d. per lb., ex wharf, prompt shipment. Spot material quoted 6⅝d. per lb., ex store.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality, 27s. 6d. per ton extra. Light soda ash, £7 3s. 9d. per ton, ex quay, minimum 4-ton lots, with various reductions for contracts.

SODIUM ACETATE.—On offer for prompt delivery at about £21 5s. per ton, ex store.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or stat on. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3d. per lb. delivered buyers' works, minimum 4-ton lots. Under 4 and over 2-ton lots, ⅛d. per lb. extra. Under 2-ton lots, 3⅛d. per lb.

SODIUM CAUSTIC.—Powdered, 98/99%, £17 17s. 6d. per ton; solid, 76/77%, £14 10s. per ton, and 70/72%, £13 12s. 6d. per ton, minimum 4-ton lots, carriage paid on contract. Spot material 10s. per ton extra.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots.

SODIUM NITRITE, 100%.—Quoted £19 10s. per ton, ex store.

SODIUM PRUSSIATE.—In moderate demand. Spot material quoted 4¾d. per lb., ex store.

SODIUM SULPHATE (SALTCAKE).—Prices 50s. per ton, ex works, 52s. 6d. per ton delivered for unground quality. Ground quality, 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption:—Solid, 60/62%, £9 per ton; broken, 60/62%, £10 per ton; crystals, 30/32%, £7 2s. 6d. per ton, delivered buyers' works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material, 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 15s. per ton; rock, £10 12s. 6d. per ton; ground American, £9 5s. per ton, all ex store.

ZINC CHLORIDE.—British material, 98/100%, quoted £24 15s. per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Offered from the Continent at about £10 5s. per ton, ex wharf.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

New Process for Treating Platinum Concentrates

THE Central Mining and Investment Corporation announces that its metallurgical and laboratory staff have devised and developed a method of treating concentrates produced by flotation processes from sulphide norite ores. The method consists of chlorination and subsequent precipitation, by means of which platinum metals can be extracted in suitable form for refining. Both the chlorination and the precipitation processes have been patented. Experimental work carried out with these processes has demonstrated that by their use about 80 to 85 per cent. of the platinoid content of concentrates can be extracted, equivalent to about 70 to 75 per cent. of the platinoid content of the original ore. In the chlorination treatment of the concentrates there is a marked preferential recovery of platinum with the result that about 85 to 90 per cent. of the platinum contained in the concentrates is extracted, equivalent to about 75 to 80 per cent. of platinum content of the original ore. Any gold contained in the chlorination residues can be easily recovered, by the use of cyanide. The group's metallurgical advisers are satisfied that these processes can be operated on a commercial scale at reasonable cost.

HEINE BROS., VIERSEN,

Manufacture nothing but Centrifugals:

Some Special Ranges are Centrifugals:

for Laundries, Hospitals, Public Baths, Households, Hotels, Curtain Factories
to dry, i.e., to hydro-extract all kinds of laundry, also to remove starch liquor.

If interested ask for pamphlet . . . . . Uea

for Dye-works, Bleaching-works, Printing-works, Dry Cleaners, Tanneries
to dry, impregnate, wash, mordant, benzinate, pink or phosphatise all kinds of yarns or piece goods, skins, felt, sponges, feathers, hair.

If interested ask for pamphlet . . . . . Tea

for Engineering Works, Hardware Factories, Railway Works, Motor Car Factories, Screw Factories, Ball Bearing Works, etc.
to remove oil.
from metal chips, metal parts, cleaning materials, lubricating pads
also to oil or lacquer all kinds
of articles before being packed.

If interested ask for pamphlet . . . . . Sea

for Galvanising Works, Button Manufacturers, Medal and Coin Manufacturers, Pearl Factories, Fancy Good, Hardware, and Toy Factories
to dry, clear- or colour-varnish metal, horn or wooden articles
to tin or galvanise metal-ware.

If interested ask for pamphlet . . . . . Zea

for Varnish Works, Cable Factories, Electrical Industry, Motor Car Works, Printing Ink Factories, Printing Works.
for cleaning and clarifying purposes
of coloured or clear varnishes, insulating varnishes, transformer oils, printing paste.

If interested ask for pamphlet . . . . . Lea

for Dairies, Margarine Factories, Farmyards,
for cleaning and concentrating milk and extracting milk sugar.

If interested ask for pamphlet . . . . . Mrae

for Oil Mills, Oil Refiners, Plantations, Miheral Oil Works, Oil Boilers
to centrifuge Seed Oil, Oil Cakes, Copra, Soap Stock, Bleaching Earth.
to clarify vegetable oils, mineral oils, tar oils.

If interested ask for pamphlet . Ce 1025a

for Sugar Refineries,
to centrifuge sugar crystals or to clarify molasses.

If interested ask for pamphlet . . . . . Zuae

for Salt Works,
to dry vacuum or pan salt.

If interested ask for pamphlet . . C 1027ae

for Starch Works,
to centrifuge rice starch, oswega starch, potato starch, tapioca starch, manioc flour.

If interested ask for pamphlet . . . . . Stae

for Coke Works, Gas Works, By-product Works,
to centrifuge Sulphate of Ammonia, Naphthaline, Anthracene, Sulphur, etc.,
to separate water from tar or to clarify tar oils and artificial oils.

If interested ask for pamphlet . C 1029 ae

for Laboratories, Clinics, Universities,
to analyse serums and all kinds of liquids.

If interested ask for pamphlet . Ce 1031 a

for Celluloid Works, Slaughter Houses, Diamond-cutting Works, Manure Works,
to recover valuable materials.

For all other applications we shall be pleased to submit special offers on request.

Address Enquiries to:—

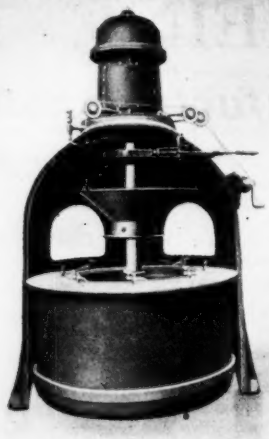
PRAGOS ENGINEERING CO., LTD.,

351, Brixton Road, London, S.W.9

TYPE 1180.
CENTRIFUGAL with DIPPING BASKET.

The basket is dipped into the tank to cover or saturate the articles, then raised and set in motion, the liquid running back into the tank.

TYPE 1196.
SUSPENDED CENTRIFUGAL.



Driven by overhead electric motor directly coupled. Bottom discharge.

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TYPE 1204.
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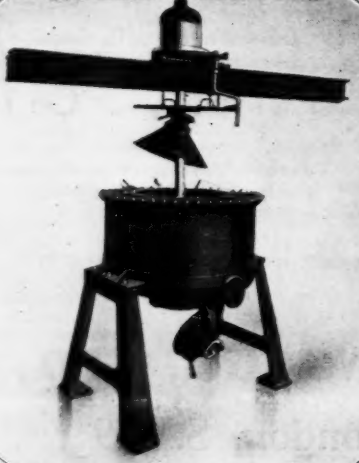
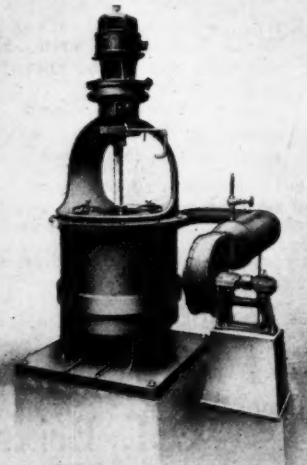


For belt drive, with bottom discharge.

TYPE 1182.
OVER-DRIVEN CENTRIFUGAL.



With fan and air heater for complete drying.

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Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, September 27, 1928.

A quietly steady business in chemicals has been experienced on this market during the past week, with home users taking fairly satisfactory deliveries of a number of the principal varieties of heavy products against contract commitments. Inquiry in the spot market continues to relate principally to relatively small parcels for early delivery, although, on the whole, in spite of the keen competition, values keep steady.

Heavy Chemicals

Hyposulphite of soda has been selling this week in moderate quantities, with offers of the photographic grade ranging from £15 5s. to £15 10s. per ton and of the commercial at about £9. Bichromate of soda is steady at round 3½d. per lb. and inquiry for this material is fairly active. Contract quotations for bicarbonate of soda are firm at £10 10s. per ton and a quietly steady demand has been reported this week. Similar conditions obtain in respect of caustic soda, offers of which are at £13 7s. 6d. to £15 7s. 6d. per ton, according to quality. Bleaching powder is only in moderate request, with offers of British material at round £7 per ton, although imported varieties are obtainable at several shillings below this. Chlorate of soda is still a comparatively quiet section of the market, but there has been little change in prices, about 2⅞d. per lb. still being quoted. Sulphide of sodium is fairly steady and a moderate business is going through at from £9 to £9 10s. per ton for the 60-65 per cent. concentrated solid quality and about £7 10s. for the commercial. Saltcake is on the quiet side, but values remain on a contract basis of £2 12s. 6d. per ton. There is a fairly regular inquiry about for prussiate of soda and prices are held at from 4½d. to 5¼d. per lb., according to quantity. Phosphate of soda is in quiet demand at up to £12 10s. per ton. With regard to alkali, this material is selling in moderate quantities, with contract offers maintained at £6 2s. 6d. per ton.

There has been a quietly steady demand about for both caustic potash and carbonate of potash and quotations are steady in each case; caustic is held on the basis of £33 5s. per ton for prompt delivery of one to five-ton lots, with carbonate at round £25 5s. per ton. Yellow prussiate of potash is moving off in fair parcels and values are maintained at from 6¾d. to 7½d. per lb., according to quantity. A moderate trade is passing in bichromate of potash at about 4d. per lb. and in chlorate at 2¾d. per lb. In the case of permanganate of potash, this is attracting a certain amount of attention at about 4¾d. per lb. for the commercial quality and 5d. to 5¼d. for the B.P. grade.

Buying interest in sulphate of copper is not particularly active at the moment, but f.o.b. values seem to be fairly firm at up to £25 5s. per ton. Arsenic is in comparatively limited demand and prices have an easy tendency at about £16 15s. per ton, on rails, for white powdered Cornish makes. There is not much stirring in the case of brown acetate of lime, offers or which are at about £8 15s. per ton, but grey meets with a moderate amount of inquiry and prices are firm at £16 10s. Nitrate of lead is in quiet request at £36 5s. per ton, as are also white and brown acetate at £41 and £39 10s. per ton, respectively.

Acids and Tar Products

Quotations for oxalic acid continue in the neighbourhood of 3¼d. to 3½d. per lb., but the demand for this material during the past week has been on quiet lines. Citric acid is still very scarce and holders of parcels for near delivery are getting from 2s. 4d. to 2s. 4½d. per lb. Tartaric acid seems to be a shade firmer at round 1s. 4¼d. per lb., and a moderate business is going through. With regard to acetic acid, inquiry is steady and glacial quality is maintained at about £66 per ton, with the 80 per cent. commercial at £36.

There has been little or no improvement this week in the demand for the by-products; some quotations are, pitch at from £2 4s. to £2 5s. per ton, f.o.b., and creosote oil at from 6d. to 6¼d. per lb. Crude carbolic acid is in relatively slow request, but there has been little alteration in values, at about 2s. 1d. per gallon. Crystals are in fair request at 6¼d. per lb. There is a moderate inquiry about for solvent naphtha, current offers of which are at round 1s. 1d. per gallon.

"American Prosperity"

An Interesting Book

There is a jargon of industry and economics from which it is difficult to escape; indeed, it is difficult for an Englishman to discuss industry, trade or commerce at all. Conversation always tails off into unemployment, doles, pensions, safeguards, trade unions and other subjects which are really politics and not industry. It is always, therefore, refreshing to turn to any work which tells us of these things without reference to our own peculiar way of looking at them. In *American Prosperity, Its Causes and Consequences* (Cape, 10s. 6d.), Mr. Paul M. Mazur writes of all the problems that confront us without any reference to our way of looking at them or our methods for dealing with them, and that makes his book well worth publishing on this side, and welcome reading to serious students of these matters.

American history, says Mr. Mazur, is the history of industry. "Industry is too definitely the marrow of our thought and outlook, too subtly interwoven with the fibres of our survival, to play a secondary rôle. As business changes—and business will change—American history will change also."

An American on America

There are many books on America by Englishmen, there are books on England by Americans, and any number of books on the world's situation by both, all of which, it will be noted, are works by authors whose qualifications must from the nature of things be limited. But here we have a book by an American on America, and on nothing else. That perhaps is its great quality. There cannot be too much study of America by those who want to understand economics. "America is not dollar-mad in the miser's manner. It is activity-mad. It likes the game of business; and it keeps score in dollars. Its successful players win, and then risk their all once more to win again."

Mr. Mazur's interesting chapter on "Distribution" will be as useful as anything in the book to the English reader. It suggests to us that we may have devoted too much attention to production and too little to the distributive problem. "For the past few years adverse criticism has been levelled against the high cost of distribution. The margin between the cost of producing an item and the price the consumer pays for it, has been broadcast so thoroughly that, without much coaxing of the imagination, one can easily visualise those engaged in distribution as rank highwaymen with black handkerchiefs over their faces and automatic pistols in their hands. By some critics of the economic system the figure is, indeed, accepted in all literalness. Somewhere on the high road which merchandise travels from producer to consumer, at any rate, there would seem to exist a bottomless abyss into which the consumer's dollars are falling!" . . . "Production became the proverbial lily upon which economist and business man painted coat upon coat of gilt. Distribution, on the contrary, received only black looks for its labours. Here, it was said, resided the waste of our economic system. And no one considered that existence of low-cost production depended upon high-cost distribution." . . . "The community that can be trained to desire change, to want new things even before the old have been entirely consumed, yields a market to be measured more by desires than by needs. And man's desires can be developed so that they will greatly overshadow his needs."

If this book secures a wide circulation among English industrialists, as it deserves to do, it may help us to get out of our political ruts. Mr. Mazur is not unaware of the cloud that hangs over the American future. He foresees that the great change wrought by the war, which turned America from a debtor to a creditor, has not been properly understood on the other side of the Atlantic. He insists that sooner or later, being a creditor, America must import more than she exports, and that perfectly truthful thought causes him some alarm.

Canadian Cadmium Plant

The new cadmium plant of the Consolidated Mining and Smelting Co., of Canada, at Trail, British Columbia, which began operations last December, is now steadily producing three-quarters of a ton daily, which is being marketed without disturbance, such has been the expansion of demand owing to the widening use of this metal in many lines of manufacture. This would have been a quarter of the world's supply prior to this year.

Company News

CHESHIRE UNITED SALT.—The directors have declared a interim dividend at the rate of 2½ per cent. in respect of the current year, payable to all shareholders on the register on October 6.

GLENBOIG UNION FIRE CLAY CO.—The directors have resolved, subject to audit, and after providing for depreciation, to recommend a dividend of 10 per cent. per annum, less tax, for the year to August 31.

BURT, BOULTON AND HAYWOOD.—After allowing £18,090 for depreciation, placing £4,458 to debenture redemption reserve, and writing £6,920 off expenses of debenture and preference issues, the net profit for the year to June 30 is £55,868. The sum of £8,388 is carried forward.

LIGHTING TRADES.—The profit for the year ended March 31, 1928, was £12,304, against £11,637, which with income from investments, £5,052, and taxation and other reserves, not now required, £4,725, etc., makes £22,086. After making provision for depreciation, and adding balance brought forward, there remains £20,262. After paying the dividend on the preference shares there is a balance of £3,125, which it is proposed to carry forward.

THOS. W. WARD, LTD.—The profit and loss account for the year ended June 30 last shows a credit balance, after charging directors' salaries, income tax, interest, and depreciation, of £55,541, which, with the amount brought forward of £23,001, together with a transfer of £25,000 from the reserve fund, makes £103,542. The directors propose to pay a final dividend on 725,000 old ordinary shares at 3¾ per cent., making 6¼ per cent. for the year, free of tax, and a dividend on 375,000 new ordinary shares (May, 1928, issue) to June 30, 1928, at 6¼ per cent. per annum, free of tax, and a final dividend on employees' shares at 1¼ per cent., making 6¼ per cent. for the year, free of tax, carrying forward £27,675.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal" have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

PHARMACEUTICAL PREPARATIONS.—A British firm of merchants established in Bombay desire agencies for British manufacturers of pharmaceutical preparations, including tooth paste, patent medicines and health salts. (Reference No. 264.)

Tariff Changes

BRITISH GUIANA.—A recent ordinance provides that no one shall import or sell by wholesale sulphuric acid unless licensed by the Inspector General.

Fatal Gunpowder Explosion in Lancashire

Two men were killed in an explosion on Friday, September 21, at the Blackbeck Gunpowder Works, near Ulverston, Lancashire, the property of F. C. Dickson and Co. An inquest was held on Monday on John Dodd and Andrew McDougall, the two men who were killed, and a verdict of accidental death was returned. It was stated that the men were working at an incorporating mill, and one was putting in a charge of powder on a bogie. The mill, which had been standing still, was started, and there was an explosion. It was also stated that there was a regulation that the mill should not be started before charges had been removed, and one witness thought this had not been done. A spark might have been caused by the bogie going over the rails. The manager said there was a verbal regulation as to the removal of charges. It was well known by the men. He could not tell the exact cause of the explosion. The jury added a recommendation that printed regulations should be posted at the works.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks, and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to October 19, 1928.

SAGRCTAN.

491,666. Class 2. Disinfectants and antiseptics. Lysol, Limited, Lysol Works, Kingston Road, Raynes Park, London, S.W.20; manufacturers. May 22, 1928.

SULPHERICIN.

493,516. Class 2. Chemical substances used for agricultural, horticultural, veterinary and sanitary purposes. Lewis Charles Wallach, 16, Finsbury Square, London, E.C.2; merchant. July 24, 1928. (To be Associated, Sect. 24.)

NOPRASEN.

494,228. Class 2. Chemical substances used for agricultural, horticultural, veterinary and sanitary purposes. Bayer Products, Limited, 31 to 34, Basinghall Street, London, E.C.2; merchants and manufacturers. August 18, 1928.

KRASNODIN.

494,184. Class 3. Chemical substances prepared for use in medicine and pharmacy. Bayer Products, Limited, 31 to 34, Basinghall Street, London, E.C.2; merchants and manufacturers. August 17, 1928.

BLADAN.

494,185. Class 3. Chemical substances prepared for use in medicine and pharmacy. Bayer Products, Limited, 31 to 34, Basinghall Street, London, E.C.2; merchants and manufacturers. August 17, 1928.

VIDALON.

494,186. Class 3. Chemical substances prepared for use in medicine and pharmacy. Bayer Products, Limited, 31 to 34, Basinghall Street, London, E.C.2; merchants and manufacturers. August 17, 1928.

BEDERMIN.

494,187. Class 3. Chemical substances prepared for use in medicine and pharmacy. Bayer Products, Limited, 31 to 34, Basinghall Street, London, E.C.2; merchants and manufacturers. August 17, 1928.

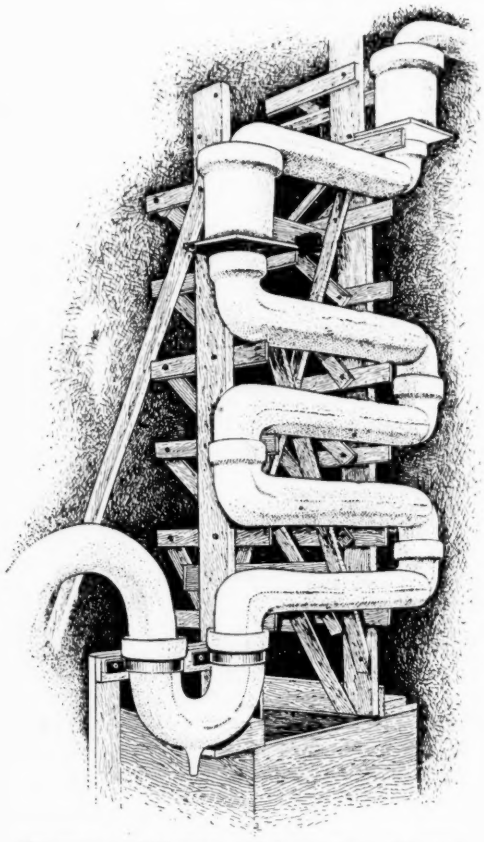
Centrifugals for All Purposes

THE PRAGOS ENGINEERING CO., LTD., of 351, Brixton Road, London, S.W.9, announce that they are the agents for the United Kingdom of the well-known Heine (Gebr. Heine Viersen, Rhineland) centrifugals. For over forty years the firm of Heine has built hydroextractors, and the machines have a wide reputation for technical perfection, efficiency, low upkeep, reliability, safe and lasting service. All types of centrifugals are constructed, of all sizes and of any speed; also constructed of special metals, with protected interiors (vulcanised, galvanised, lead-covered, etc.) for all purposes. The drive of every machine can be adapted to suit existing conditions. Standard machines are generally in stock, and special types can be supplied in a short time. The experimental station and staff are at the service of firms desirous of investigating the suitability of centrifugals for new processes or new products.

Distillers' Co. Extensions at Hull

THE Distillers' Co., Ltd., London, have informed the Humber Conservancy Board of their proposal to erect new works at Salt End, Hull. It was reported that the company desire to take for the present 800,000 gallons of water per hour from the River Humber, and to convey it through pipes to the proposed works. After use for cooling purposes the water would be discharged into Hedon Haven. The Conservancy Board offered no objection to the proposals, providing the water discharged was free from objectionable matter. Extensive works at Salt End, manufacturing commercial alcohol, have been acquired by the Distillers' Co. within recent years, and important extensions are foreshadowed in the new scheme.

The "VITREOSIL"



COLUMN OF "VITREOSIL" ABSORPTION VESSELS.

System of
HYDROCHLORIC ACID ABSORPTION

THESE VESSELS set up Vertically one above the other can be thoroughly Water Cooled.

Economies of Floor Space and Efficiency of Operation are secured. There are no submerged joints.

In this System an intimate contact of the gas with the liquid is secured by means of the liquid curtain formed by the drops falling from the central depression and through which all the gas must pass.

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Telephone Nos. 42 & 43 Wallsend. *Telegrams: "Thermal, Wallsend"*

ABC Code, 5th & 6th Editions, & Bentley's used

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*

WRIGHT (E.) AND CO., LTD., 55, Brook Street, Bradford, chemical manure merchants. (C.C., 29/9/28.) £13 13s. 4d. August 25.

Deeds of Arrangement

HALL, George Edward, and PROVAN, Harold Dunn, trading at 43, South Lane, Rochdale, as HALL AND PROVAN, manufacturing chemists. (D.A., 29/9/28.) Dated September 18, filed September 20. Trustee, A. A. Yorke, 4, Cannon Street, Manchester, accountant. Liabilities unsecured, £1,838; assets, less secured claims, £1,918.

HORNER, Charles Robert, trading as C. R. HORNER AND CO., 8, Chatham Street, Piccadilly, Manchester, chemical merchant. (D.A., 29/9/28.) Dated September 11, filed September 18. Trustee, P. R. Fowler, 5, John Dalton Street, Manchester, C.A. Secured creditors, £89; liabilities unsecured, £2,496; assets, less secured claims, £461.

MISELL, David, and MISELL, Julian, 10, Rangoon Street, E.C., chemical merchants. (D.A., 29/9/28.) Dated September 14, filed September 20. Trustee, W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., accountant. Liabilities unsecured, £1,808; assets, less secured claims, £508.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

BLUE SKY SOAP CO., LTD., London, E.C. (M., 29/9/28.) Registered September 11, debenture, to Bank; general charge. *Nil. February 23, 1927.

HYGIENIC PAINT AND VARNISH CO., LTD., Leeds. (M., 29/9/28.) Registered September 14, £2,000 mortgage, to Leeds Permanent Building Society; charged on properties in Holbeck. *£2,000. February 2, 1928.

Satisfactions

SQUIRE (J. H.), LTD., Manchester, manufacturing chemists and wine merchants. (M.S., 29/9/28.) Satisfaction registered September 14, £1,000. October 19, 1925.

WILSON VETERINARY MEDICINE MANUFACTURING CO., LTD., Ashford (Middlesex). (M.S., 29/9/28.) Satisfaction registered September 14, £200, registered July 11, 1909.

New Companies Registered

BAKER AND COMPANY (MANCHESTER), 1928, LTD., Crabtree Lane, Clayton, Manchester. Private company. Registered September 24. Nominal capital, £30,000 in £1 shares (10,000 7½ per cent. cumulative preference and 20,000 ordinary). To acquire the business of Baker and Co. (Manchester), Ltd., to adopt an agreement between the said old company and the liquidator thereof of the first part, W. Cundiff of the second part, Mary J. Cundiff of the third part, F. W. Cundiff of the fourth part and this company of the fifth part, and to carry on the business of chemical manufacturers, and merchants, drysalters, dealers in drugs, chemicals and chemical products, etc. Directors: W. Cundiff, "Greystones," Lytham Road, Blackpool, F. W. Cundiff, and Mary J. Cundiff.

W. MORGAN AND SONS, LTD., Princes Road, Merton. Registered September 22. Capital, £10,000 in £1 shares. To adopt an agreement with V. C. Morgan for the sale of the goodwill, undertaking and certain assets of the business of a japan and varnish manufacturer carried on by him at Merton, Surrey, and elsewhere as "W. Morgan and Sons" and the "Amber Varnish Co."

SOLIDOL CHEMICAL (FRANCE), LTD., 16, St. Helen's Place, London, E.C.3. Registered as a "public" company on September 24. Nominal capital, £200,000 in 2s. shares. Druggists, chemists, manufacturers, and merchants in chemicals and drugs, perfumes, etc.

Industry in the Free State

Statistics on Chemical Manufacture

THE statistics branch of the Irish Free State Department of Industry and Commerce has published returns recorded under the Statistics Act, 1926, relating to the operations in 1926 of the twenty-three establishments engaged in the manufacture of chemicals, drugs, and paints in 1926. The quantities and nett selling values of the products are as follows:

	£
Drugs and medical preparations	21,734
Galenical preparations	18,825
Other drugs and medicines	12,429
Other chemicals, including disinfectants	12,119
Oils and tallow	21,074
Paints and varnish—	
Paste in paste or mixed—589 tons	32,665
Other colours—38 tons	3,112
Varnish, oil and spirit—33,673 galls.	16,900
Ink—4,343 galls.	2,028
Putty	2,455
Other products	3,948
Total	147,289

The cost of the ingredients used was as follows: Oils, crude and refined, £18,067; turpentine, £2,452; white lead, £1,130; gums, £2,862; pigments or dry colours, £3,904; all other ingredients, £32,021; total, £60,436. The cost of the fuel, etc., used was £1,862, and the estimated cost of bags, cases, tins, bottles, replacing tools and repair to plant, executed by the firm's own workpeople, was £15,474. The net output amounted to £69,517. The total salaries were £13,464, and wages and earnings £12,210. The number of persons employed was: males 143 (of whom six were under eighteen years of age); females 90 (of whom nine were under eighteen years of age); total, 233.

With the exception of three factories, which were closed down for short periods, work was carried on continuously in the industry during 1926. The normal number of hours worked in the case of nine factories was 48 per week, in the case of eleven factories 43 to 44 hours per week, and the remaining three factories worked 40 hours per week.

Benn Brothers' Other Journals

THE CABINET MAKER.—Special Autumn Birmingham Number: Round the Birmingham Trade; Kidderminster Notes; The Use of Colour in Furniture; Autumn Programmes for Technical Schools.

THE ELECTRICIAN.—Autumn Trade Promotion Number: "Autumn Window Display," by A. E. Hammond; The National Radio Exhibition, Olympia; Autumn Trade Promotion.

THE FRUIT GROWER.—Problem of Glasshouse Heating; West Cambs. Fruit Show; "Growers Day" at Imperial Fruit Show.

GARDENING ILLUSTRATED.—Bulbs to Plant Now; Dahlias in the London Parks; New Daffodils; Potting Lachinalias.

THE GAS WORLD.—Fuel Conference and World Power Conference; Problems of the Gas Industry in America; Some Present-Day Problems in Long Distance Gas Distribution in Germany.

THE HARDWARE TRADE JOURNAL.—Autumn Annual: Hardware Trade Prospects in London and the Provinces; Autumn Window Display; Retailers Advertising; Radio Exhibition: Some Outstanding Features.

THE TIMBER TRADES JOURNAL.—The Third Empire Forestry Conference; Hardwood Grading Rules: Proposal "C" Again; Launch of the Timber Trade Lecture Season; Sawmill: Problems of Wood Waste.